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An analysis of 319 case reports of mandibular fractures

■ *Edmund H. Hagan,* D.D.S., M.S., East Lansing, Mich., and Donald F. Huelke,† Ph.D., Ann Arbor, Mich.*

Case histories of 319 patients treated at the University of Michigan Hospital between 1948 and 1958 for fractures of the mandible were studied to determine the causes of fracture, the site of trauma, whether they were single or multiple fractures and the fracture locations. Almost 75 per cent involved males and one half of all patients were between 14 and 26 years old. Multiple fractures of the mandible occurred in 53.6 per cent of the patients. Eight out of ten patients were treated by closed reduction. Less than 10 per cent of the condylar fractures were treated by open reduction.

Although many studies on various phases of mandibular fractures have been presented, many still need to be made before there can be a full understanding of this complex problem. Certainly there are outstanding papers dealing with fractures in specific regions; however, many reports are not statistically valid or are outdated. A review of the literature has shown that not all analyses of case histories on mandibular fractures agree. In addition, many earlier reports are less meaningful today because of changing social and economic conditions which have brought about, among other things, more leisure time, more automobiles, and younger drivers.

The case histories of fractures analyzed herein are typical of those found in many hospitals today since more than one half of the fractures discussed in this report resulted from automobile accidents.

The cause of mandibular fractures and the age of the individuals most commonly involved have changed throughout the years. These and other variables result in changes of fracture location and of fracture complexity, and thus, changes in the mode or method of treatment required.

■ *Material*

The data for this report were compiled from 319 case histories of individuals treated at the University of Michigan Hospital between 1948 and 1958. The data included age, sex, race, state of

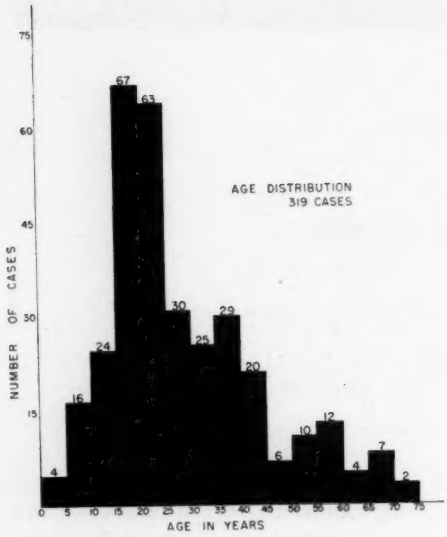

Fig. 1—Mandibular fractures

dentition, cause of fracture and site of trauma. Drawings of the location and direction of the fracture lines were made from roentgenograms.

Most of the patients in this study were males (73.1 per cent). The data were not separated on the basis of sex or race since relatively few Negro and female patients were involved.

The age of the individuals varied from 3 to 75 years (Fig. 1). Approximately one half (49.5 per cent) of all the patients involved were between the ages of 14 and 26 years, with the 10 to 20 or 20 to 30 age groups being most common.

Many authors[1-7] have found that mandibular fractures occur most frequently in the 20 to 30 year age group. Kulowski[8] stated that the majority of facial injuries involved young adults. Ivy and Curtis[9] found most fractures occurred in persons over 18 years of age. Others[10-13] have indicated that the most common age group is 30 to 40 years. These differences may depend partly on the time (1915-1939) of the study and the geographical location. Reither's study,[13] for example, referred to Munich between 1945 and 1953, a postwar period.

■ *Cause of Fractures*

Automobile accidents were the most frequent cause of mandibular fractures in this study (Table 1). Fractures resulted from automobile accidents more than three times as often as from fist fights, and more than five times as often as from falls. In the 14 to 26 year age group, auto accidents accounted for 65.8 per cent of the fractures; 57 per cent of the fractures due to fist fights also occurred in this group. Miscellaneous factors — sporting events, injury by animals, tooth extraction, and so on—accounted for 14.4 per cent of the total (Table 1). Many authors[1, 5, 9, 10, 12, 14, 15] have indicated that fist fights are the most frequent cause. Others[3, 4, 7, 8] regard automobile accidents as the major cause, whereas certain re-

Table 1 • Cause of 319 cases of mandibular fractures

Cause	Number of cases	Per cent
Auto accident	178	55.8
Fist fight	54	17.0
Miscellaneous*	46	14.4
Falls	32	10.0
Unknown	9	2.8
Total	319	100.0

*Miscellaneous causes: hit by auto (5), kicked by animal (6), sporting events (10), hit by elevator, door, tractor scoop, crane hook, steel bar, beer bottle, falling wall (7), motorcycle accident (3), kicked in face (3), plane crash (2), tooth extraction (2), osteomyelitis (2), gunshot (1), blasting cap—intraoral (1).

ports[13, 16, 17] have shown that fist fights or automobile accidents were equally responsible, each occurring in approximately 26 to 33 per cent.

Schmuziger,[18] the Swiss investigator, and Rowe and Killey[6] (Great Britain) indicated that mandibular fractures in motorists accounted for less than 7 per cent of all mandibular fractures. In both of these countries the majority of the people use other means of transportation (buses, bicycles, motor scooters, and so on). Additionally, some large city hospitals do not receive many patients with jaw fractures resulting from automobile accidents. Walters and Recant,[14] for example, reviewed 100 instances treated at the Harlem Hospital in New York City, the patients therein coming from a poor and densely populated area. In their study, automobile accidents accounted for only 8 per cent of all fractures, whereas impacts of fists or weapons accounted for the majority of jaw fractures (85 per cent).

Approximately two thirds of the patients between the ages of 14 and 26 years in this study were in automobile accidents. This indicates that young automobile drivers and occupants are involved more frequently in this type of traumatizing experience than any other age group. These figures agree closely with the statistics of the National Safety Council.[19]

■ *Site of Trauma*

The site of the trauma to the mandible was determined from the patient's statements as recorded in the hospital reports, more specifically by the lacerations, contusions, or abrasions in the areas of impact. At times the case histories stated the trauma site simply as "to the chin," with no other information. In these instances the term "chin area" was recorded as the site of the trauma. Data on the site of trauma were available in all but 8.5 per cent of the patients.

In one half of the patients, the mandible was hit in the region of the chin (Table 2). Blows to the chin point were more frequent than those to either of the adjacent lateral chin areas. The supporting bone of the anterior teeth was the site of trauma in only a few patients. In these instances the object causing the trauma was relatively narrow (for example, a horse shoe or steering wheel). In two out of five persons, the blow was directed to either the right or left body of the mandible. Direct trauma to the angle was rare, but when it occurred the angle was always fractured. No instances were found wherein the subcondylar region was the site of direct blows.

■ *Single and Multiple Fractures*

In the 319 case reports of this study, there was a total of 576 fracture sites, an average of 1.8 fractures per patient. Trauma to certain regions of the mandible caused a relatively greater number of fractures; more mandibular fractures per patient resulted from blows to the chin point or chin area (Table 2).

Single fractures of the mandible, the most frequent in this study, were seen in 46.4 per cent of the series (Table 3). Double fractures of the mandible occurred in about one third of the patients, and triple fractures occurred in approximately 20 per cent. More than three fractures of the mandible were found in less than 4 per cent of the patients. In this study.

a comminuted fracture at one location was considered as a single fracture. Of the single fractures, 3.1 per cent were comminuted, and 7.8 per cent of the multiple fractures included at least one comminuted fracture.

Certain authors[6, 15, 20] have reported that single fractures occurred in 40 to 50 per cent of their cases of fracture. Many authors[1, 2, 5, 7, 9, 21, 22] have indicated that approximately two thirds of all cases involve only one fracture of the jaw and that patients having three or more fractures of the mandible are seen infrequently, occurring in less than 6 per cent. Some investigators[3, 4, 10, 23] found single fractures in 70 to 100 per cent of their patients with fractures. Archer,[24] however, claimed that single mandibular fractures are uncommon.

Double fractures of the mandible were found in 32 per cent of the patients in the present series; certain previous investigations have shown that double fractures occur in 25 to 35 per cent.[1, 5, 7, 9, 21] The figures of Dunning[10] indicate low occurrence (10 per cent), whereas others[6, 14, 15, 20, 22] indicate a much higher one (40 to 52 per cent). Many reports state that the double fractures most frequently seen involve the mental foramen region of one side and the opposite angle.[1, 6, 7, 9, 12, 14, 20, 23] Mallett,[22] however, indicated that this combination occurred in only 11 per cent.

Of all the multiple mandibular fractures (171 patients), seven different patterns of fracture location account for more than one half (60.3 per cent) of the total. Of the double fractures, most frequently the fractures were of the angle on one side and the body on either the opposite (15.8 per cent) or same side (3.5 per cent) or with fractures of the lateral chin

Table 2

Site of trauma

Location	Number of cases	Number of fractures	Ratio—cases : fractures
Chin point	65 (20.4%)	131	1:2.0
Lateral chin			
Right	32 (10.0%)	61	1:1.9
Left	34 (10.6%)	65	1:1.9
Chin alveolar process	4 (1.3%)	4	1:1.0
Chin area*	30 (9.4%)	60	1:2.0
Body			
Right	56 (17.6%)	90	1:1.6
Left	67 (21.0%)	115	1:1.7
Angle			
Right	—	—	—
Left	2 (0.6%)	2	1:1.0
Ramus			
Right	2 (0.6%)	2	1:1.0
Left	—	—	—
Unknown†	27 (8.5%)	46	1:1.7
Total	319 (100.0%)	576	1:1.8

*Specific area of the chin region not indicated.
†Clinical records incomplete.

Table 3 • Types and number of mandibular fractures

Single fractures	— 46.4% (148)		
Condyle	(52)	Alveolar process	(9)
Angle	(42)	Ramus	(4)
Body	(25)	Midline	(2)
Lateral chin	(13)	Coronoid process	(1)
Double fractures	— 31.9% (99)		
Triple fractures	— 19.5% (62)		
Quadruple fractures	— 2.5% (8)		
Six fractures	— 0.6% (2)		

region on the opposite side (4.1 per cent). In 15.8 per cent the fractures were located in the subcondylar region of one side and the opposite body (11.1 per cent) or opposite lateral chin region (4.7 per cent).

In the present study, almost one half (46.8 per cent) of the 62 triple fractures had both subcondylar regions and a unilateral chin region as the fracture sites. Quadruple fractures included at least one subcondylar and almost always a lateral chin fracture. The greater frequency of this type of fracture is a result of the automobile accidents occurring while the cars are going at high speeds. In such accidents the chin is frequently the region of impact, with the energy being dissipated adjacent to or beneath the site of the trauma and at the relatively narrow neck of the mandible. Krømer's study[25] indicated that three or more fractures are the most frequent (46 per cent); however, in a third of his patients, the fractures had been caused by gunshot and shrapnel wounds during World War II. We feel that his high frequency of multiple fractures is, in part, due to the high energy impact of bullets and shrapnel.

In 83.4 per cent the mandible alone was fractured; in 16.6 per cent the mandible and at least one associated skull bone were fractured.

■ *Fracture Location*

SUBCONDYLAR FRACTURES—The subcondylar region was the most frequently (36.3 per cent) fractured portion of the mandible (Table 4). Approximately one

Table 4 • The relation of fracture location to site of trauma (576 fractures)

Fracture location	Site of Trauma								
	Chin point %	Lateral chin %	Chin area %	Chin alv. process %	Chin region total %	Body & angle %	Ramus %	Unknown %	Total %
Subcondyle	14.1	6.8	5.0	—	25.9	8.5	—	1.9	36.3
Body	1.9	5.4	1.4	—	8.7	10.4	—	2.1	21.2
Angle	1.0	3.8	0.7	—	5.5	12.7	—	2.3	20.5
Lateral chin	3.5	4.5	2.6	—	10.7	2.1	0.2	1.0	13.9
Alveolar process	0.5	0.3	0.9	0.7	2.4	0.2	—	0.2	2.8
Ramus	0.2	0.7	—	—	0.9	0.9	0.2	0.2	2.2
Coronoid process	0.7	0.3	—	—	1.0	0.9	—	0.2	2.1
Midline	0.7	—	0.3	—	1.0	—	—	—	1.0
Total	22.6	21.8	10.9	0.7	56.0	35.7	0.4	7.9	100.0

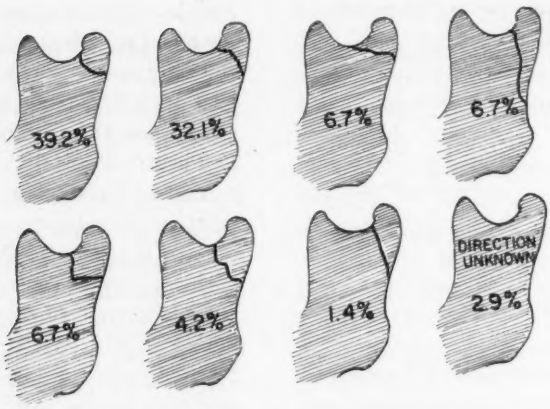

Fig. 2—Direction of subcondylar fracture lines in lateral view

half (111) of the 219 subcondylar fractures were unilateral, occurring more frequently on the right side, and were found with equal frequency as either the only fracture or with others located elsewhere on the mandible. Bilateral subcondylar fractures, however, almost always occurred (in 46 of 49 patients) with other fractures, usually with lateral chin (33 of 46 patients) or body fractures (10 of 46 patients). If two adjacent regions of the mandible are considered together, then it is the body-angle region of the jaw that is most often involved (41.7 per cent).

The direction of subcondylar fracture lines, as seen in lateral view roentgenograms, showed considerable variability (Fig. 2). The majority of subcondylar fractures occurred low on the neck of the condyloid process, being either convex or concave in relation to the condyle. Less frequently, horizontal, vertical, or angulated fracture lines were seen. Subcondylar fracture lines in posteroanterior view were more frequently directed obliquely downward, either medially or laterally, or less often, were transversely oriented (Fig. 3). In patients with bilateral subcondylar involvement, the direction of the fracture lines was usually not the same on both sides. Of the 49 patients with bilateral subcondylar fractures, 26 (53.1 per cent) had been hit on the chin point. In most of these cases (16), the fracture line direction was different on each side. From our study it was observed that the direction of the subcondylar fracture lines varied without regard to the site of trauma. Automobile accidents were the main cause of subcondylar fractures (69.4 per cent).

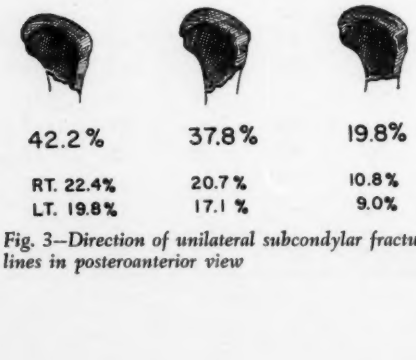

Fig. 3—Direction of unilateral subcondylar fracture lines in posteroanterior view

Many authors[1-4, 7, 9, 10, 23] have indicated that subcondylar fractures are infrequent, occurring in less than 10 per cent. Others[6, 16, 17, 22] have found the subcondylar region to be involved in 13 to 36 per cent of the patients.

BODY FRACTURES—Fractures of the mandibular body—between the mental foramen and the second molar—occurred in 21.2 per cent of the patients. The majority of these fractures were unilateral (in 106 of 122 patients) occurring almost twice as often on the right side as on the left. In almost all patients with a unilateral body fracture (single or combined with other mandibular fractures) the site of trauma was either the body or lateral chin region on the same side as the fracture. Multiple mandibular fractures, including a body fracture, occurred in 89 of the 114 patients, most of which (58) had one other fracture located in another region of the mandible. Fractures of only the body of the mandible occurred in 25 persons (19 right, 6 left). There were three instances of bilateral fractures of the body of the mandible in which other regions were not involved.

Using the base of the mandible as the reference point in the review of the roentgenograms, it was noted that most of the fracture lines of the body were directed upward and forward (Fig. 4). As seen in posteroanterior view, half of the body fractures passed obliquely outward and forward; transverse fractures were more common than those which passed obliquely inward and forward. Combining the two views, it was noted that in over half of the oblique body fractures (lateral view) the fracture line passed obliquely forward and outward from the lingual cortical plate.

Statements to the effect that the mental foramen is a region of weakness are found in certain articles on mandibular fractures.[1, 9, 12, 17, 26] In our study, 9.1 per cent of all patients had a fracture that passed through the mental foramen, indicating that this is as weak a region as is the lateral chin region which was fractured in 13.9 per cent. Fractures through the mental foramen were usually (27 of 29 patients) associated with other mandibular fractures, most often with a unilateral (11 patients) or bilateral (6 patients) subcondylar fracture.

ANGLE FRACTURES—Fractures of the gonial angle or antegonial notch were found in 20.5 per cent of the patients. All of the angle fracture lines passed forward and upward to extend through the alveolus of the third molar (37 per cent),

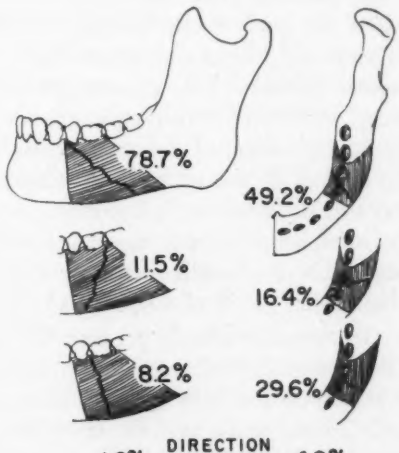

Fig. 4—Direction of fracture lines as found in 122 cases of mandibular body fractures

to the retromolar trigone (32 per cent), or to the space between the second and third molars (21 per cent). In 10 per cent of the angle involvements, the fracture line passed between the first and second molars or into the alveolus of one of these teeth. With equal frequency, the angle fracture lines passed either obliquely inward, or outward, or transversely across the horizontal ramus. Angle fractures were more common on the left side than on the right, whereas the reverse was true with body fractures. When angle and body fractures were combined, 41.7 per cent of all mandibular fractures occurred in the horizontal ramus behind the mental foramen.

Thirty-six per cent of the 118 angle fractures were isolated single fractures. Both angles were fractured in 6 persons of whom three did not have other mandibular fractures.

In certain reports[2,3,9,14,15] body-angle fractures occurred in 50 to 60 per cent of the patients. Dean[1] and Mallett[22] reported the angle to be fractured in 37 per cent and 29 per cent respectively of fracture patients. The percentages presented by Asbell[4] and Dunning[10] agree closely with those of the present study.

In half of the multiple mandibular fractures, unilateral angle fractures had at least one body fracture associated with them. This was usually a fracture of the opposite side (in 27 of 40 patients).

In approximately 80 per cent (89 of 112 patients), angle fractures were caused by a blow to the face over the body or angle (57 per cent), or to the lateral chin region (22 per cent) on the same side as the fracture. Infrequently the opposite angle or both angles fractured because of a blow to the mandibular body. Fractures of the left lateral chin region were associated with angle fractures more than twice as often as right lateral chin fractures; right subcondylar fractures were found more often with angle fractures than left subcondylar fractures.

LATERAL CHIN FRACTURES—The region between the mental foramen and the mental trigone—the lateral chin region—was fractured in 13.9 per cent of the patients in this series. Unilateral fractures were the most frequent, occurring in 55 per cent on the left side and in 40 per cent on the right. Rarely (2 patients) was this region fractured bilaterally.

Lateral jaw roentgenograms indicated that in two thirds of the patients the fracture lines in the lateral chin region passed obliquely down and backward to the base of the mandible. In one fourth of the 80 fractures they were vertically oriented. Infrequently (7.5 per cent) the fracture lines passed from the alveoli obliquely down toward the midline of the chin and passed through the lower lateral portion of the mental trigone where the buttressing effect of the trigone is minimal. If the fracture line extended further medially, beyond the midline, it was classified as a midline fracture. Lateral chin fracture lines passed directly through the bone (43.7 per cent), or passed obliquely from the lingual to labial cortical plate, obliquely toward (43.7 per cent) or away from (12.5 per cent) the midline.

In most instances (83.7 per cent), lateral chin fractures were combined with other fractures of the mandible. Fractures of the neck of the mandible were more

frequently associated (65.0 per cent) with those of the lateral chin region than were angle (17.5 per cent) or body (7.5 per cent) fractures. Most lateral chin fractures (75.0 per cent) were caused by a blow to the anterior part of the jaw.

Fractures of this region have been listed separately by most authors under the headings of bicuspid, cuspid, and incisive regions. By totaling the percentages of the various studies, it is found that most authors[6, 7, 9, 17, 20] show a higher frequency of fractures located in this region (29 to 55 per cent).

ALVEOLAR PROCESS FRACTURES—Fractures involving only the supporting bone of the teeth were rare (2.8 per cent) and almost always involved the anterior teeth. The alveolar fragment generally contained 3 or 4 teeth. Seventy-five per cent of the alveolar process fractures were caused by a blow to the anterior part of the mandible. In 25 per cent the lateral chin region, the left body, or an unknown region was the site of trauma. Alveolar process fractures occurred as the only mandibular fracture in 9 of the 16 patients (56 per cent).

RAMAL, CORONOID PROCESS AND MIDLINE FRACTURES—Ramal fractures were infrequent (2.2 per cent). The site of trauma varied from the chin region to the ramus itself. Usually ramal fractures were found with others of the body of the mandible (in 9 of 13 patients). Only one patient had fractures of both rami. Certain authors[1, 9] did not report finding ramal fractures; others[5, 7, 10, 15, 21, 24] found ramal fractures in 0.2 to 11.9 per cent, usually about 4 per cent.

Fractures of the coronoid process likewise were infrequent (2.1 per cent) and were almost always associated with other mandibular fractures, usually with those of the adjacent subcondylar region. In one half of these fractures, the site of trauma was to the chin point or to the lateral chin region. One third of the coronoid fractures (4 patients) were caused by a blow to the same side as that of the fracture. In only two persons was the overlying zygomatic arch fractured.

Coronoid process fractures have not been mentioned in certain articles[7, 13, 20, 26] or have been shown to be rare.[5, 6, 12, 21, 24] Direct coronoid fractures are rare because the process is well protected by the overlying and attaching muscles, and by the maxilla and zygomatic arch in front and to the side. No instances were found wherein the fractured coronoid process was displaced. The heavy fibers of insertion of the temporalis muscle all along the anterior edge of the coronoid process and ramus stabilizes the fragment, thereby preventing displacement.

Midline fractures were the least frequently seen. Included in this category are all those fractures which passed through the mental trigone. In only one instance did the fracture line pass vertically downward directly on the midline of the chin. All other fracture lines were oblique, beginning at the alveolar process of one side and extending downward to the base of the mandible of the opposite side. The site of trauma in these patients was the anterior part of the jaw. In two persons the midline fracture was the only fracture of the mandible; the four other patients also had at least one subcondylar fracture. One of these patients also had

fractures of the body and both coronoid processes. All of the studies presented here show that fractures of the midline are infrequent; however, in about one half of these reports,[1,7,9,10,15] this type of fracture was more common than those of the subcondylar region.

■ *Location of Fractures and Site of Trauma*

The data in Table 4 indicate that certain generalizations can be made concerning the site of trauma and the fracture location. The majority of the subcondylar fractures resulted from a blow to the chin region, most often to the chin point. More often the body of the mandible was fractured by a direct blow to the region of the fracture. Approximately two thirds of the angle fractures were caused by a blow to the body or angle of the mandible. Frequently fractures between the midline and the mental foramen were caused by blows to the anterior part of the jaw as were most fractures of the alveolar process.

■ *Relation of Age to Fracture Location*

A definite relation exists between the age of the person and fracture location. In the younger persons, subcondylar and lateral chin fractures were the most common; fractures of these regions decreased in frequency with an increase in age. Angle and body fractures were more frequently found in older patients; in patients between 40 and 75 years old over half of the fractures occurred in the angle-body region of the mandible. Although the frequency of fractures of the ramus, midline, alveolar, and coronoid processes varied in the different age groups, no valid conclusions can be drawn from these figures because of the small number of persons having these fractures.

■ *State of Dentition and Fracture Site*

Some relation exists between the fracture location and the state of dentition. Edentulous persons have a higher frequency of body and angle fractures than subcondylar fractures. Subcondylar fractures were more common in persons in whom the posterior right or left mandibular teeth were missing. The presence of mixed dentition did not have a notable effect on fracture location, although the incidence of alveolar process fractures was higher in the group with mixed dentitions. In part, this could be accounted for by the object which caused the fracture (baseball bat, horseshoe, and so on).

■ *Treatment of the Fractures*

A review of the treatment accorded the 319 patients indicated approximately 8 out of 10 patients were treated by closed reduction. Often in persons with multiple mandibular fractures, only one fracture site was treated by open reduction whereas the other fractures were treated by a closed reduction. This was especially noted in condylar fractures where less than 10 per cent were treated by open reduction.

■ *Physical Properties and Biomechanics*

The factors in the production of mandibular fractures are mechanical in nature—the physical properties of the bone and its mechanical behavior under

stress. Force involves magnitude, direction and duration of application of the energy at impact. The magnitude of the energy of the impact varies considerably. A fracture of the jaw will not occur if the force is below a certain limit. However, if the velocity and direction of an object is the same, a higher magnitude and rate of absorption of the impact energy will be more likely to produce a fracture.

The energy of an object at impact is transmitted throughout the entire mandible, regardless of the site of trauma. The neck of the mandible usually has the smallest cross-sectional region and the lowest resistance to bending of any region, so it is here that a fracture is likely to occur when the blow is to the region of the chin. The high frequency (72 per cent) of subcondylar fractures resulting from blows to the chin region and especially to the chin point supports this observation.

Fractures of the body or angle of the mandible are usually caused by impacts to these regions. Here there is a localized deformation at the site of impact with the bone bending medially.

The physical properties of the bone will, in part, determine its response to stress. The mandible is neither homogeneous nor isotropic; like wood it has a grain pattern, reflecting the direction and orientation of haversian canals.[27] Differences in the thickness of the cortical bone, the closed marrow cavity, the nonuniform cross-sectional region, the discontinuities (mental foramen, lingula, and so on) and the rugosities (mental trigone and lingual tuberosity) will influence the biomechanical response of the mandible under loading. Because of these structural differences throughout the bone, certain regions of the jaw are more resistant to fractures whereas other regions will tend to concentrate the stresses and fractures more readily.

To account for the mechanism of fracturing, a bone of the complexity of the mandible should be regarded as a problem in biomechanics which must be solved by experimental methods rather than armchair speculation.

■ *Summary and Conclusions*

The data for this study were compiled from 319 case histories of mandibular fractures. Roentgenograms were utilized with case descriptions and operative notes to determine the direction of fracture lines.

In this study, almost 75 per cent of the mandibular fractures involved males, with one half of all patients being between the ages of 14 and 26 years. Automobile accidents were the most frequent cause of the mandibular fractures, the chin region being the site of impact more often than any other region.

In 53.6 per cent of the patients, the mandible was fractured in two or more locations. The subcondylar region was most commonly fractured (36.3 per cent). Single subcondylar fractures may be isolated but bilateral subcondylar fractures almost always involved at least one other region.

Fractures of the body of the mandible were usually the result of a blow to the body or lateral chin region on the same side as the fracture.

Most of the angle fractures (80 per cent) were caused by a blow to the body or lateral chin region on the same side.

At times (15.8 per cent), the mandibular body, most frequently the opposite side, was fractured when an angle fracture occurred.

Lateral chin fractures almost always were unilateral, and were usually combined with other fractures, the most common of which were fractures of the subcondylar region.

Alveolar process fractures were infrequent; they were especially prevalent in persons with mixed dentition.

Fractures of the ramus, coronoid process, and midline were rare and almost always were associated with other mandibular fractures.

A study of fracture location in relation to the age of the patient showed a decrease in frequency of subcondylar and lateral chin fractures as the person's age increased. Body and angle fractures, however, were more common in the older age groups.

Edentulous individuals had a higher frequency of body and angle fractures and a lower frequency of fractures of the subcondylar region. Subcondylar fractures were frequent in partially edentulous persons.—903 *East Grand River Avenue.*

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■ The Value of Professing Ignorance

It wasn't until quite late in life that I discovered how easy it is to say: "I don't know."—*W. Somerset Maugham.*

Predicting depth of insertion of needle required to anesthetize the maxillary nerve by way of the pterygopalatine canal

■ *Alfredo Reis Viegas,* D.D.S., M.P.H., São Paulo, Brazil, and F. M. Hemphill,† Ph.D., Ann Arbor, Mich.*

There is no method presently available for determining the depth of insertion of the needle when blocking the second division of the fifth cranial nerve via the pterygopalatine canal. Two methods are used based on skull measurements and multiple computations and adding the thickness of the palatal mucosa to arrive at a formula for depth of insertion. This formula can be applied to all patients, regardless of age, sex and race and the possibility of entry into the orbit with the needle seems to be nil.

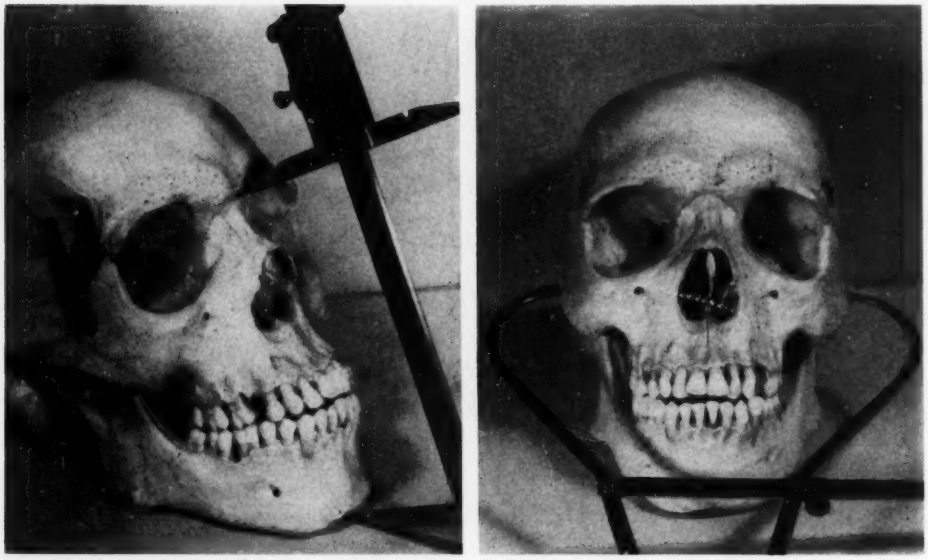
To obtain good anesthesia when blocking the maxillary nerve, the solution must be deposited as near as possible to the trunk of that nerve at the level of the rotundum foramen. At present no method is available for determining the depth required for insertion of the needle. At attempt was made, therefore, to develop a method for determining the depth required, a technic to ensure that the point of the needle will approximate the precise location of the foramen rotundum.

■ *Review of Literature*

Peckham[1] and Rankow[2] state that the needle must penetrate 37.5 mm. Duchange[3] concludes that the foramen rotundum is found, on an average, 30 to 31 mm. from the major palatine foramen, and to this dimension should be added the thickness of the palatine mucosa which corresponds to 5 mm. in the adult, 3 mm. in old age and 2 mm. in children. Cook[4] says,

> The distance from the posterior palatine foramen, the site of needle puncture, to the origin of the spheno-palatine nerve(s) varies widely in individuals, and there is no fixed landmark from which to calculate these distances. The only aid in calculating these distances is the average as determined by measurements on dry specimens. To determine this factor 200 measurements were made and recorded and the charts show the distances varying from 30 to 40 mm. with an average of practically 35 mm.

However, he emphasizes the following point, "Although the 35 mm. average is important in the calculations for the



Left: Obtaining height of face. Right: Obtaining width of face

depth of needle insertion, it is not a guide which can be taken as constant. The only true guide is the operator's knowledge of the field which he is invading." Cook states that the measurements were made on dry specimens and, hence, did not take into consideration the thickness of the soft tissue which covers the posterior palatine foramen, tissue which varies from 4 to 7 mm.

Nothing was found in the literature to determine the depth of insertion of the needle required for this type of anesthesia in children.

■ *Method of Study and Data Obtained*

Observations were made on 256 skulls and of this number 203 were selected for study. The 53 skulls were discarded because the height of the face was affected by the absence of teeth or incomplete articulation.

The facial height, that corresponds to the distance from the gnathion (middle point of the lower border of the mandible at symphysis) to the nasion (point of approximation between the frontal and two nasal bones), was measured with sliding calipers (illustration, left). The zygomatic breadth that corresponds to the distance between both zygions (maximum point anteroposteriorally and vertically of the zygomatic arches), was measured by spreading calipers (illustration, right). The length of the canal which corresponds to the distance from the major palatine foramen to the lower limit of the foramen rotundum was measured by using a flexible needle (1⅝ inches in length and 23 gauge) carrying a guide made from cork.

The complete data from the measurements, available at the School of Public Health, University of Michigan, were studied by two methods developed to employ multiple correlation:[5]

Method 1: The data were studied by relating average facial height, zygomatic breadth and canal length (average of right and left side) of all skulls.

Method 2: The data were studied by relating facial height, zygomatic breadth and average canal length of the same skulls, but divided into five facial types.

The facial types were obtained by utilizing as a formula of facial index, facial height times 100 divided by the zygomatic breadth. The five groups of facial types obtained from this facial index were:

Group 1 = x − 79.9° Hypereuryprosopous
Group 2 = 80.0 − 84.9 Euryprosopous
Group 3 = 85.0 − 89.9 Mesoprosopous
Group 4 = 90.0 − 94.9 Leptoprosopous
Group 5 = 95.0 − x Hyperleptoprosopous

■ *Method 1*

Using Method 1 with a computing form for multiple correlation of three variables, x_1 corresponds to facial height, x_2 to zygomatic breadth and y to average canal length. Measurements used in these computations were taken to the nearest 0.1 mm. In the formula y is equal to a predicted length of the canal which corresponds to the required length of the needle for accurate anesthesia. An example follows in applying the formula to a skull which had a facial height of 12.3 mm. and a zygomatic breadth of 12.8 mm.

$$y = 2.08 + 1.69\,(12.3) + .76\,(12.8)$$
$$y = 2.08 + 20.78 + 9.73$$
$$y = 32.5 \text{ mm.}$$

The predicted average length of the canal was 32.6 mm., the actual measured length of the canal for this skull was 32.7 mm., a difference of 0.1 mm., which indicates that the predicted insertion of the needle would be 0.1 below the foramen rotundum, the point where the maxillary nerve must be reached.

■ *Method 2—Computing Form*

The computing forms (multiple correlation—3 variables) were worked out for the five facial types. The formulae developed are:

Group 1 Hypereuryprosopous
$Y = -1.47 + 3.(6X_1 + .02X_2$

Group 2 Euryprosopous
$Y = -6.36 - 2.85X_1 + 5.38X_2$

Group 3 Mesoprosopous
$Y = 8.47 + 2.27X_1 - .28X_2$

Group 4 Leptoprosopous
$Y = .59 + 1.20X_1 + 1.30X_2$

Group 5 Hyperleptoprosopous
$Y = 29.06 + .11X_1 + .19X_2$

■ *Evaluation of Data*

The standard error (SE) was employed to see if there were any statistically significant differences between the first and second method. It follows:

Method 1	Method 2
$\bar{x}_1 = 1.883$	$\bar{x}_2 = 1.889$
$\sigma_1 = 2.41$	$\sigma_2 = 2.40$
$n_1 = 203$	$n_2 = 203$
$SE\bar{x}_1 = .0537$	$SE\bar{x}_2 = .0532$

Diff. $1.889 - 1.883 = .006$
SE diff. $\sqrt{(.0532)^2 + (.0537)^2} = \sqrt{.0056} = .074$
$t = \frac{.006}{.074} = .08$

Such a minor difference is not statistically significant. Therefore, the data from this study indicate no improvement of prediction when a classification into facial types is utilized. In other words, prediction made by the single general equation of Method 1 is equally acceptable and involves fewer calculations. Either of these methods may permit the prediction of the length of the canal for any person regardless of age, sex or race, since the study included skulls of children and adults, male and female, white and nonwhite, Brazilian, Japanese, Portuguese and Italian. The depth of penetration suggested by Peckham, Rankow, Duchange and Cook can be applied only to adults.

An area of 7 mm. above the lower limit of the foramen rotundum is safe, inasmuch as the needle cannot enter the orbital cavity. This study showed that all predictions of canal length were within such a limit.

A comparison of the procedures advised by Peckham and Rankow (32.5 mm. and 5 mm. discounted to compensate for the thickness of the palatine mucosa) of Duchange (30.5 average) and Cook (Cook advised that 35 mm. cannot be used as a constant and his figure was used only as a constant to provide a rough comparison) with the data secured by this study shows that the needle might go into the orbital cavity 20 times for the first two measurements, 15 for the third and 34 for the last one.

If an area of 2.5 mm. above and below the foramen rotundum in which to expect to obtain satisfactory anesthesia is accepted, Method 1 shows no predicted measurement above and but 32 below, 15.76 per cent of the 203 subjects observed. Therefore, an effective anesthesia could be expected in 84.24 per cent of patients. Method 2 produced no predicted measurement above and but 28 below, which corresponds to 13.79 per cent; therefore, an effective anesthesia could be expected in 86.21 per cent of the patients when this method is used.

If an area of 5 mm. above or below is accepted, only three predicted average canal lengths obtained by the first method fall outside of this area (−5.3, −6.3 and −6.8). By the second method only four patients would fall outside this range (−5.1, −5.6, −6.2 and −6.7), 98.53 per cent of effective injection from the first method and 98.03 per cent from the second method.

The predictions of canal length are of the pterygopalatine canal itself; they do not include the thickness of the tissue that covers the posterior palatine foramen. Hence, 5.0 mm. must be added to these measurements for the adult, 3.0 mm. for the elderly patient and 2.0 mm. for the child. In addition, it is necessary to make a calculation for the thickness of the skin which covers the facial bones when the measurements of facial height and zygomatic breadth are secured from living patients in order to correct the measurements presented here because these measurements were secured from dry specimens. A simple method to make such a calculation is to fold the skin of the neck under the mandible and measure it and divide by two.

As shown in the illustration, left, the height of the face was measured and in illustration, right, the width of the face was determined. The measurements fol-

low: height, 129.0 mm. or 12.9 cm., width, 68.5 mm. or 6.85 cm. Applying these measurements to the formula one obtains:

$$y = 2.08 + 1.69\ x_1 + 0.76\ x_2$$
$$y = 2.08 + 1.69\ (12.9) + 0.76\ (6.85)$$
$$y = 2.08 + 23.15 + 5.20$$
$$y = 30.43 \text{ mm.}$$

"y" becomes the predicted depth of insertion of the needle. To this measurement, the thickness of the tissue that covers the posterior palatine foramen must be added.

For an adult, it would be necessary to add 5.0 mm. or 0.5 cm. in securing the final length of the insertion required of $30.43 + 5.0 = 35.43$ mm.

■ *Summary*

An attempt has been made to develop a method for determining the depth to which the needle must be inserted to make certain that the point is reasonably near to the foramen rotundum when blocking the maxillary nerve through the pterygopalatine canal.

A formula, based on multiple correlation, has been developed:

$y = c_o + c_1x_1 + c_2x_2$ or $y = 2.08 + 1.69\ x_1 + 0.76\ x_2$, in which y is equal to the predicted average canal length, x_1 equals facial height, x_2 equals zygomatic breadth, and c_o, c_1 and c_2 are constants.

This method probably can be applied to any patient regardless of age, sex or race. Additional studies should be initiated in order to develop two formulas, one including only skulls of children and the other only skulls of adults. A better prediction of canal length could be obtained after such a study, because the average canal length in children is less than that of adults.

■ *Conclusions*

Two methods, based on multiple correlation, may be used to predict the average canal length of the pterygopalatine canal prior to blocking the second division of the trigeminal nerve. These methods can be used regardless of sex, age and probably race.

The possibility of penetration of the needle into the orbital cavity seems to be eliminated when these formulas are used. —*Caixo Postal 8099.*

*School of Public Health, São Paulo University, Brazil.
†Professor, public health statistics, University of Michigan.

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■ The Value of Service

One thing I know: The only ones among you who will be really happy are those who will have sought and found how to serve.—*Albert Schweitzer.*

Bacteriologic examination of a continuous pipetting system for administration of intravenous anesthetic solutions

■ *Paul M. Burbank,* D.M.D., and R. Quentin Royer,† D.D.S., Rochester, Minn.*

With the increasing use of reservoir technics for intravenous anesthesia, the possibility of bacterial contamination must be considered. The present study failed to demonstrate contamination.

General anesthesia has much to offer the patient who undergoes oral surgical procedures. Beforehand, he need not fear the operation; afterwards, he will not remember a frightening experience. And with intravenous administration the patient has minimal postoperative discomfort from the anesthesia.[1]

The most important consideration in the use of any anesthetic agent, however, is its safety. In the use of intravenous anesthetic agents, one of the prime concerns is that the solution be completely sterile.

Intravenous agents have been widely accepted by oral surgeons for the production of anesthesia for oral surgical procedures. Agents such as thiopental sodium are suitable because they allow (1) quiet and rapid induction, (2) sustained maintenance of a light plane of surgical anesthesia and (3) rapid recovery.

Improved technics for the production of anesthesia by the intravenous route have been developed by Bullard,[2] Hubbell,[3] Olson,[4] Thompson,[5] and Krogh.[6] These oral surgeons and others have found it necessary to adopt such procedures to fulfill the needs of the oral surgical patient.

■ *Systems of Administration*

Among the changes in the technic of administration, a trend has been discernible. Several systems utilizing reservoirs have been devised that enhance the convenience of using intravenous agents; and these have been adopted readily by many oral surgeons[3, 7, 8] because of their many advantages, which include minimizing the amount of equipment (syringes) needed, eliminating waste of the anesthetic solution, shortening the time for preparation of the anesthetic and sterilization of equipment, and affording ease of administration in practices where anes-

thesia is to be employed in many successive patients.

Perhaps the strongest factor in favor of this type of equipment is that the oral surgeon is able to inject the anesthetic agent with one hand the instant it is needed, thus allowing the nurse anesthetist-assistant to devote her full attention to the important task of maintaining an adequate airway. With this thought in mind, Pavel[9] devised equipment with which the anesthetic solution could be administered accurately by means of a foot-operated mechanism, thereby freeing both hands for the important tasks within the oral operative field.

MECHANISM OF THE RESERVOIR SYSTEM—The essential equipment in most reservoir systems for intravenous anesthetic agents consists of either a salvarsan bottle or an intravenous fluid bottle (the reservoir) for storage of the anesthetic solution, from which the solution is carried to an injection apparatus through rubber tubing. About 18 inches of small-gauge rubber tubing, fitted with a glass observation tube, leads from the injector to a 20 gauge needle for injection into the vein.

Various types of injectors are being used presently, all of which utilize some kind of two-way valve mechanism. One of the more widely favored models[7] consists of a 5 cc. rubber bulb and two-way valve mechanism which can be manipulated with one hand for rapid injection of the anesthetic solution. Several others have been made by joining a Becton-Dickinson two-way valve with a graduated glass syringe[9,10] of the more standard kind.

One of the greatest advantages of this setup, in addition to the features already mentioned, is that for sterile technic, it is necessary to replace only the sterile needle and short tubing to the injector after use with each patient.[7]

OBJECTION TO THIS SYSTEM—Despite its several obvious superiorities, however, many oral surgeons are reluctant to accept this method of administration of intravenous anesthesia. They believe that even with the utmost of care and sterile technic, an infectious organism or agent may possibly be transmitted from one patient to the next. They argue that it is possible for blood-borne viruses and bacteria from an infected patient to enter and travel the length of the needle and tubing (which is new and sterile for each patient) and lodge in the two-way valve mechanism of the injection apparatus. The next patient, they contend, could be contaminated with this virus or bacteria upon subsequent injection of solution, even though the length of tubing from the injection mechanism to the site of venipuncture was sterile.

■ *Purpose*

Our purpose in the study here reported was to evaluate the bacteriologic safety of a continuous pipetting (reservoir) system used for intravenous administration of anesthetic agents. Under particular scrutiny was the two-way valve portion of this system.

■ *Materials and Methods*

The reservoir system used for the purposes of this study was assembled from a continuous pipetting outfit, which is made by combining a two-way valve

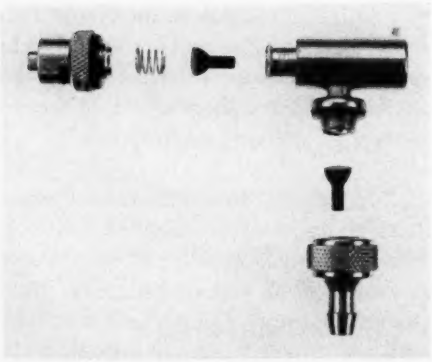

Fig. 1—Correct assembly for parts of the two-way valve (B-D double valve)

(Fig. 1) with a Cornwall Luer-Lok syringe (Fig. 2). The reservoir for the anesthetic solution in our setup was a 300 cc. salvarsan bottle. This was connected to the two-way valve by 4 feet of rubber tubing. The unit was then ready for intravenous administration upon connecting 18 inches of rubber tubing from the two-way valve to the glass observation tube and 20 gauge needle (Fig. 3).

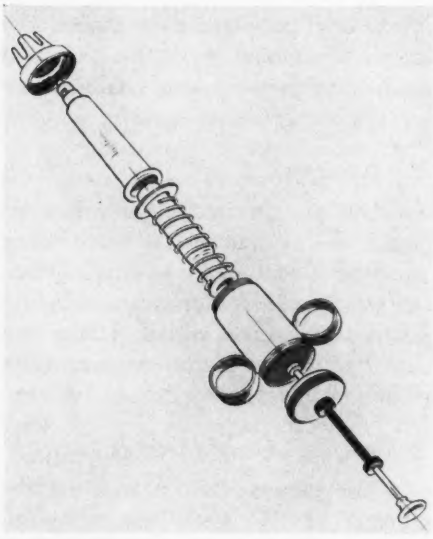

Fig. 2—Schematic diagram of the working parts of the B-D Cornwall Luer-Lok syringe

The assembled apparatus (Fig. 3) was sterilized by autoclaving. To test the system, and specifically the seating of the individual valves in the two-way valve, the salvarsan bottle was filled with sterile nutrient broth. This was drawn into all

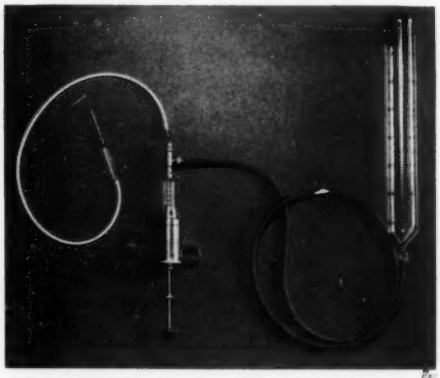

Fig. 3—Continuous pipetting outfit ready to be used for intravenous administration of anesthetic solution

the rest of the system and the needle was inserted into a 24-hour broth culture of *Escherichia coli*. The valve system was opened and closed five times by drawing sterile broth from the reservoir and forcing it into the contaminant broth culture.

After an interval of 15 minutes the needle, observation tube, and tubing were disconnected at the two-way valve and a sterile needle was attached. Then 0.5 ml. of nutrient broth was inoculated from the reservoir system into each of five tubes of sterile broth. These tubes were incubated and checked for the presence or absence

of growth. Subsequent experiments were altered so that the time of contact with the culture of *Esch. coli* was varied from 15 minutes to 3 hours, thus simulating administration of anesthesia over both short and long periods. More specifically to test the effectiveness of sterilization by heat, additional experiments exactly like those described were carried out on ten successive days with use of a valve assembly that had been sterilized by autoclaving each day.

■ *Results and Conclusions*

No growth was observed in any of the culture mediums inoculated from a reservoir system after contact with a heavily contaminated broth culture of *Esch. coli* by means of the apparatus described. The results indicate that the valves within the two-way valve assembly functioned in such a manner that cross contamination did not occur.

The conditions of this experiment were much more formidable than would be encountered in any clinical experience. The nutrient broth with which the entire system was filled is much more encouraging to the growth of microorganisms than thiopental sodium would be. Also, the 24-hour broth culture of *Esch. coli* provided a contaminant more severe than would ever be met within a human vein.

From these facts we can conclude that the two-way valve system functioned in such a manner that contamination of the reservoir system did not occur. We may conclude further that the apparatus described, when properly assembled, sterilized and utilized, is safe for actual clinical use.

Bacteriologic work carried out in the section on bacteriology of the Mayo clinic.

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The Mayo Foundation, Rochester, Minn., is a part of the Graduate School of the University of Minnesota.

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■ DIAGNOSIS

In fact, the knowing what kind of problem is worth while to attack is in general more important than the mere carrying out of the necessary steps.—*Albert A. Michelson.*

Clinical comparison of ethoheptazine and aspirin with other analgesic combinations

■ *Clinton E. Haynes,* D.D.S., and*
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Four hundred and thirty-nine outpatients who experienced pain associated with oral surgical procedures were given a placebo or one of four analgesic combinations—ethoheptazine-aspirin, codeine-aspirin, codeine-A.P.C. compound, and d-propoxyphene-A.P.C. compound. The efficiency and side effects were determined subjectively. All four combinations proved to be reasonably efficient. When mild or moderate pain was present, the effectiveness of the combinations was extremely great, but placebo activity was almost equal. In instances of severe and moderately severe pain, placebo reaction fell considerably. The codeine-A.P.C. mixture showed the least loss of effectiveness under these conditions. More side effects were produced by codeine-aspirin and d-propoxyphene than by the other two combinations or the placebo.

The chemical and pharmacological properties of ethoheptazine have been published.[1-6] Clinical reports have indicated that it is an effective and safe analgesic substance.[7-9] A preliminary survey of the efficiency of combined ethoheptazine citrate and aspirin (Zactirin) in the control of pain associated with dental surgical procedures has been conducted.[10] It indicated that the combination usually was capable of relieving pain of this origin.

This study was undertaken to establish more exactly the degree of analgesia afforded by the combination relative to other analgesic compounds when used clinically in similar cases. Comparison was made by using a two-part double- and triple-blind design. No attempt at crossover or pair evaluation was made because of the difficulties arising from the brief duration and variable intensity of the pain and the fact that all subjects were outpatients. The combinations compared with ethoheptazine and aspirin were codeine and aspirin, codeine and A.P.C. compound, d-propoxyphene and A.P.C. compound, and a placebo.

■ *Materials and Method*

Patients undergoing diagnostic and treatment procedures in the oral surgical clinic of the Washington University School of Dentistry were utilized for the study. The principal criterion for selection was the presence or the possibility of pain. Children ten years of age and under were not included nor were patients with

a history of drug reaction. Other than these two qualifications, no selection was attempted in the hope of matching the kinds of patients and painful situations that would be apt to appear in routine oral surgical practice.

Any patient of this kind, then, with a complaint of pain or in whom surgical procedures would be such that pain might be expected received one of the disguised drugs at random with instructions for oral self-administration.

Four hundred and thirty-nine patients were used, representing about five sixths of those that qualified for the study. Failure of patients to report for follow-up appointments and failure to follow dosage instructions accounted for the fraction of incomplete cases. For the most part, postoperative pain after extractions was encountered. Race and sex were typically distributed among the subjects and age ranged from 11 to 90 years.

DRUG DISTRIBUTION—The analgesic compounds tested were all prepared by the Wyeth Laboratories, Philadelphia, in identical uncolored gelatin capsules and were packaged in identical dark brown bottles of 12. The ingredients of the capsules and the amounts of each are shown in Table 1. Each bottle was labeled only with the code letter for the components contained. The amounts of drugs in each capsule were so arranged that two capsules would contain the usual therapeutic dose of that combination. Identical verbal instructions were issued with each bottle, as follows:

> Take two capsules every four hours as necessary to relieve pain. Do not take the capsules to prevent pain. Take only as many doses as are necessary to relieve pain and return the unused portion and the bottle at your next appointment.

The study was conducted in two parts to facilitate the drug distribution. In the first part ethoheptazine-aspirin was compared with codeine-A.P.C. and codeine aspirin. The three compounds each received two code designations yielding, then, six groups. In the second part ethoheptazine-aspirin was compared with d-propoxyphene-A.P.C. and a placebo. The drugs were given three code symbols; the placebo, two, yielding eight partitions.

The two portions of the study each ran six months and were separated by a three month interval.

DATA COLLECTION—A specially employed assistant was responsible for distributing the drugs, maintaining patient records and interviewing the patients. The clinicians' roles were only to select patients—those in whom they expected pain or those in whom pain was already present. It was felt that the assistant, unfamiliar with clinical technics and less experienced in anticipating or evaluating patients' reactions, would be the least biased individual for gathering data. In addition, having only one person collecting information from the patients in a consistent manner ought to have minimized variation among the great many interviews involved. However, the time consumed by the study required using a different interviewer in the two halves of the work.

In both parts of the study all patients were questioned in an identical manner utilizing a Mimeographed report sheet

from which the questions were read verbatim. The case report form is shown in the illustration.

The resulting information, then, on both the severity of the pain and on the degree of relief afforded by the tested compounds was entirely of a subjective nature, no objective measures being attempted. It, was, of course, for this reason that the patients were instructed not to take the drugs to prevent pain.

■ *Results*

The results were as follows:

ANALGESIC EFFICIENCY—The distribution of patients according to their estimates of pain intensity and the subsequent relief afforded by the analgesic compounds and the placebo are shown in Table 2. The category, "Appreciable Relief," consists of the sum of those recordings of "mostly relieved with slight notice-

Table 1

Analgesic compounds tested

Symbols	Ingredients per capsule*	
	Part 1	
"A"	Ethoheptazine citrate	75 mg.
"M"	Acetylsalicylic acid	325 mg.
	Corn starch	40 mg.
	Magnesium stearate	5 mg.
	Codeine sulfate	16 mg.
"H"	Acetylsalicylic acid	325 mg.
"L"	Corn starch	99 mg.
	Magnesium stearate	5 mg.
	Codeine sulfate	16 mg.
"N"	Acetophenetidin	161 mg.
"O"	Acetylsalicylic acid	226 mg.
	Caffeine	32 mg.
	Magnesium stearate	10 mg.
	Part 2	
†	Dextro-propoxyphene	32 mg.
"K" "J"	Acetophenetidin	162 mg.
"Q" "C"	Acetylsalicylic acid	227 mg.
"S" "X"	Caffeine	32.4 mg.
	Corn starch, reduced	93.6 mg.
†	Ethoheptazine citrate	75 mg.
"B" "P"	Acetylsalicylic acid	325 mg.
"R" "F"	Corn starch, reduced	195 mg.
"G" "D"	Magnesium stearate	10 mg.
†	Lactose powder, U.S.P.	500 mg.
"E" "L"		
"W" "T"		

*As stated by Wyeth Laboratories.

†Two supplies were used, each with three code symbols to prevent degradation during an interruption in the study for the summer months. Only one half of the coded portions were in use at any one time.

Case report form

1. How many doses (two capsules) did you take the first day_____How often?_____
2. How many doses did you take the second day?_____How often?_____
3. (a) Would you say the pain was: (1) severe; (2) moderately severe; (3) moderate; (4) mild or slight?_____
   (b) Was the pain relief: (1) complete; (2) mostly relieved with slight noticeable pain; (3) some, but pain was still aggravating; (4) no relief?_____
   (c) How soon after taking the capsules did you notice relief?_____
   (d) Did you notice any abnormal effects from the drug?_____
   (e) While you were taking the capsules, did you notice any:
   (1) wakefulness; (2) drowsiness; (3) nausea; (4) vomiting; (5) dizziness; (6) drunkenness; (7) constipation; (8) other?
   _____
   When did this occur? (Record relation to treatment, time of day, number of capsules, etc.)_____
   _____
   (f) Have you ever had a similar reaction from aspirin?_____
   Do you take aspirin frequently?_____
4. Total dose_____(Num. of capsules) over_____days.

able pain" and "complete" relief obtained in the interviews.

The figures show that all four of the analgesic compounds tested scored fairly well in their ability to relieve all intensities of pain encountered. Only in instances of severe and moderately severe pain was there an apparent difference in the degree of analgesia obtained from the four compounds and this was pronounced only when elimination of pain was the measure of analgesia. The other results are uniformly high but the samples do show a step-wise decrease in success as the estimates of pain intensity increase and the categories of relief are narrowed. This is particularly noticeable in the placebo, in which a reduction of efficiency of from 92 per cent to 14 per cent occurs, and is least noticeable with the codeine-A.P.C. combination in which the loss of effectiveness is negligible.

The percentages illustrated in Table 2 are not absolute values, of course, and their significance is relative to the variables within the framework of the experiment. When the chi square test, using Yates' correction, was applied for paired comparison of the compounds within each half of the study, only the differences existing between ethoheptazine-aspirin and d-propoxyphene-A.P.C. versus

the placebo were valid at a high level of confidence (99 per cent). The variation in sample size which could not be controlled in anticipating pain prevented the other values from being proved significantly different at a similar level of confidence.

The codeine-A.P.C. combination surpassed the ethoheptazine-aspirin in instances of severe pain with slightly less than 95 per cent confidence. Considering the variables involved in clinical testing of this nature such limits of error (less than 10 per cent) can be considered acceptable. Dissimilarity could not be demonstrated at a significant level between the results obtained with ethoheptazine-aspirin and codeine-aspirin or between ethoheptazine-aspirin and d-propoxyphene-A.P.C.

With this in mind, however, these facts seem valid:

1. In instances of moderate or mild pain associated with oral surgery, all the compounds tested are capable of providing a high degree of relief. In view of the placebo's effectiveness at this level, agents of lesser activity, that is, the antipyretic analgesics, undoubtedly would be equally effective.

Table 2

Analgesic effectiveness

Part 1

Compound	Severe and moderately severe pain			
	Complete relief		Appreciable relief	
Codeine-A.P.C.	30/32	94%	31/32	97%
Codeine-aspirin	24/29	83%	27/29	93%
Ethoheptazine-aspirin	27/37	73%	30/37	81%
Compound	**Moderate and mild pain**			
	Complete relief		Appreciable relief	
Codeine-A.P.C.	44/46	96%	45/56	98%
Codeine-aspirin	32/37	86%	36/37	97%
Ethoheptazine-aspirin	36/38	95%	37/38	97%

Part 2

Compound	Severe and moderately severe pain			
	Complete relief		Appreciable relief	
Ethoheptazine-aspirin	18/30	60%	26/30	81%
d-Propoxyphene-A.P.C.	12/23	52%	19/23	83%
Placebo	3/21	14%	7/21	33%
Compound	**Moderate and mild pain**			
	Complete relief		Appreciable relief	
Ethoheptazine-aspirin	51/60	85%	60/60	100%
d-Propoxyphene-A.P.C.	45/50	90%	50/50	100%
Placebo	27/37	73%	34/37	92%

Table 3 • Incidence of side effects

	Part 1			Part 2		
	Codeine-A.P.C.	Codeine-aspirin	Ethoheptazine-aspirin (1)	Ethoheptazine-aspirin (2)	d-Propoxyphene-A.P.C.	Placebo
Headache	1	0	0	2	4	1
Nausea	2	2	1	0	3	0
Nausea and vomiting	2	4	0	0	1	0
Drowsiness	4	6	4	1	9	3
Dizziness (drunkenness)	2	4	0	0	5	0
Excitement	0	1	0	0	0	0
Skin rash	1	0	0	0	0	0
Epigastric	0	1	0	0	0	0
Other*	1	0	0	4	1	2
Total	13	18	5	7	23	6
Total cases	78	66	75	90	73	58

*Unclassified complaints were "burning in throat," "cramps in legs," "heart beat too fast," "constipation" and "odd feeling."

2. In instances of similar origin in which the patient complains of severe or moderately severe pain, all the compounds would show some decrease in effectiveness with codeine-A.P.C. producing the fewest failures.

With regard to the experimental outline, these facts seem valid:

1. The patients' estimates of pain intensity are a worthwhile criterion for measuring pain severity. This is reflected in the placebo's step-wise loss of effectiveness as the estimates of intensity increased.

2. Pain severity must be taken in account in measuring analgesic activity as placebo effectiveness is extremely high with moderate and mild dental pain.

SIDE EFFECTS—The incidence of side effects that accompanied the six partitions is shown in Table 3. Chi square pairings of the number of symptoms induced were undertaken and the results were:

1. The codeine-aspirin and the d-propoxyphene-A.P.C. combinations produced a significantly greater number of untoward reactions than ethoheptazine-aspirin and codeine-A.P.C. in the cases studied.

2. The number of reactions accompanying ethoheptazine-aspirin was not greater statistically than that obtained with the placebo.

■ *Discussion*

The arbitrary divisions of pain severity and subsequent relief that were selected for this study lacked proved advantage but bowed to no suggested alternatives. The "all or none" pattern of evaluations given by the patients, which

made only slight use of the middle ground, gave the impression, however, that such categories need not be numerous, simply distinct.

The subjectivity to which the evaluations were linked proved a worthy measure for a study of this size. Certainly, within any given period, the responses of a patient might be expected to vary as much as they vary between individual patients; but, although discrepancies may exist at the lower intensities of pain as manifested by the placebo's efficiency, by the same criterion, responses indicating greater pain were apparently consistent.

The importance of the manner of interviewing patients for information of this sort is demonstrated well by the data gathered here on side effects. In the study previously mentioned,[10] where ethoheptazine-aspirin was evaluated alone and openly, the incidence of side effects exceeded 20 per cent, a number far in excess of that obtained in this work (7 per cent). The difference is thought to lie in the manner of questioning. In the first study, patients were read a list of effects and they indicated their choice. In the new work, only two antagonistic choices were offered. Any other effects had to be volunteered by the patient rather than selected from a tempting list. So the incidence recorded here is thought to be a better gauge than that previously reported. It must be recognized, however, that the effects noted by the patients were of necessity those which appeared only after brief administration of the drugs to individuals who, in most instances, had undergone the rather traumatic experience of oral surgery. Certainly some of the effects—nausea, dizziness, vomiting—are of such nature as to indicate a relationship to the surgical procedures. Therefore, as an index to the actual number of occurrences which might be expected of any one drug, the figures could be misleading. Relatively speaking, since all of the drugs received similar handling and were coded into several partitions, the statistical differences among the drugs are great enough to be mentioned (recalling, too, that patients with a history of drug sensitivity were not included in this study).

The different analgesic values obtained for ethoheptazine-aspirin in the two parts of the study undoubtedly were related to the interviewing of the patients. The fact that a different interviewer was employed for each half has been mentioned. This was the only significant change made during the study. Although certainly the time lapse and patient population inconsistencies are inherent variables in such a study, the differences in these values are primarily a reflection of the interviewers' manner of reading the questions and recording and evaluating the answers.

The selection of a level of significance for the statistical evaluation of the data in comparing the codeine-A.P.C. combination with ethoheptazine-aspirin was influenced by the consistent results obtained with the former combination against all gradients of pain intensity encountered. Since instances of severe dental pain are a primary concern of the oral surgeon, the success of the codeine-A.P.C. in such instances emphasizes its importance clinically. The loss of efficiency of the other compounds when severe pain occurred, even though the resulting levels

of effectiveness remained relatively high, is noteworthy.

■ *Summary and Conclusions*

Four hundred and thirty-nine patients who experienced pain associated with oral surgical procedures were given one of four analgesic combinations or a placebo. Studied in usual clinical doses were ethoheptazine-aspirin, codeine-aspirin, codeine-A.P.C. compound and d-propoxyphene-A.P.C. compound. The substances were coded to conform to a double- and triple-blind experimental design.

The efficiency and side effects of the agents were determined from subjective data and subsequent statistical analysis, applied to compare the ethoheptazine-aspirin combination with the other agents.

All four combinations proved to be reasonably efficient in the patients studied. When mild or moderate pain was present, the effectiveness of the combinations was extremely great, but placebo activity was almost equal. In instances of severe and moderately severe pain, placebo reaction fell considerably and the tested combinations showed varying degrees of reduction in efficiency. The codeine-A.P.C. mixture showed the least loss of effectiveness under these conditions.

From the standpoint of side effects, the ethoheptazine-aspirin combination scored in the range of the placebo whereas the codeine-aspirin and d-propoxyphene produced significantly more reactions.

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■ Humility

Humility is teachableness. The truly humble man—scientist or layman—keeps open the spirit of inquiry, because he knows that he does not "know it all."—*K. N. Hildebrand. Achieving Real Happiness, 1955.*

Management of sudden collapse in the dental chair

■ *Allen B. Dobkin,* M.D., Syracuse, N. Y., and Max Brook, D.D.S., Saskatoon, Canada*

Sudden collapse in the dental chair requires immediate attention to restore the flow of oxygenated blood to the patient's brain. The patient must be placed in the horizontal position without delay and resuscitative measures taken immediately to assure effective respiration.

J. G. Bourne[1] quotes Morrison as having warned, in 1873;

"Any dentist neglecting to place his patient in a horizontal position will fail to acquit himself of blame in case of death from syncope . . . . this position should be secured on the first symptoms of fainting . . ."

Sudden cardiorespiratory collapse may occur most commonly under three circumstances in the dental chair: When a patient fears pain, dreads anesthesia, or has severe pain; during induction or emergence from nitrous oxide-oxygen anesthesia with a hypoxic mixture, or following reaction to injection of a local anesthetic, with or without epinephrine. If the patient is kept upright in the dental chair after fainting, regardless of the cause, permanent damage to the brain, or death, may follow.

Syncope occurring outside the dental office is not ordinarily a cause for great concern, because the victim usually falls to the ground with the resulting improvement in circulation to the brain, and consciousness is regained quickly. Although collapse of the patient in a dental chair is relatively uncommon, the implications are far more serious, because death may occasionally ensue as a result of cerebral hypoxia, since the dental chair supports the head in the upright position. A fatal collapse in the dental chair is a great tragedy for the dentist as well as for the patient, because with a few simple measures, this catastrophe can almost always be averted.

■ *Treatment*

Much has been written about the essential first step that is expected of the dentist before undertaking treatment of a patient, particularly if the patient is obviously in poor physical condition.[2] Usually a brief medical history is elicited with particular reference to heart and lung disease, drugs that are being taken for medical treatment, and any previous sensitivity reactions to administered local anesthetic drugs.[3] The dentist prepares appropriate supportive drugs when he is worried about the general physical condition of his patient, or suspects that a reaction to local anesthesia might occur. Sometimes he desists from treatment of

the oral problem until a medical consultation is obtained. Even with these precautions, cardiorespiratory collapse may occur with such suddenness and is often so completely unexpected that it is of paramount importance for the dentist to have a set, simple routine which can be used in managing this event. Therefore he should always institute measures which are instantly effective in restoring a clear airway, visible evidence of breathing, and adequate blood flow to the brain, even if the patient is in extremis.

The dental office, except under the best circumstances, is not equipped with resuscitation equipment as would be found in a hospital emergency room, and the dentist usually works without professional assistance. Therefore, the treatment of a patient who has collapsed in the chair must be managed in such a way that the vital functions are restored to normal immediately, without wasting time to prepare and administer supportive drugs or to call for help. Regardless of the cause of collapse—whether it is syncope from fear, hypoxia from gas anesthesia, reactions to local anesthetics, or from a heart attack, stroke or epileptic seizure—the initial and most important measures are the same: the head is lowered so that the body is horizontal or the head is lower than the feet, and direct artificial respiration is performed.[4]

Any patient in the dental chair who becomes very pale—especially if preceded by cyanosis, and who has associated profuse sweating—should be placed in a horizontal position at once. If a slow bounding or a rapid weak pulse is observed and breathing becomes feeble or is absent, direct artificial respiration should be started immediately, either with a suitable source of oxygen equipment, or by the expired air of the dentist.

Many dentists have the patient stoop forward and lower the head to the knees when he feels faint. Although this maneuver is often effective, it is better practice to place the patient in the reclining position, where the dentist can observe the color, and secure a clear airway, especially if the patient is "bullnecked" or obese. Those who have equipment for administering oxygen may feel that they are helping the patient merely by applying the mask to the face, whereas it is essential to observe the chest move freely with each spontaneous breath. When artificial respiration must be performed, the chest should be observed to expand each time the reservoir bag is compressed manually, or each time the respirator cycles. Otherwise the patient's airway is obstructed and administration of oxygen is ineffective.

The directions for performing effective direct artificial respiration when no oxygen or resuscitation equipment is available are shown in Figure 1. As soon as the collapsed patient is placed in the horizontal position, the dentist must make sure that the suction apparatus is turned on full and is immediately at hand for use in case of vomiting. The head is tilted back as far as it is possible to extend the neck, and foreign material is quickly removed from the mouth. If there is any spasm in the jaw muscles, the thumb must not be inserted in the mouth, but the mandible is supported either over the chin as shown in the second diagram of Figure 1, or the operator presses up on the angle of the jaw. The dentist

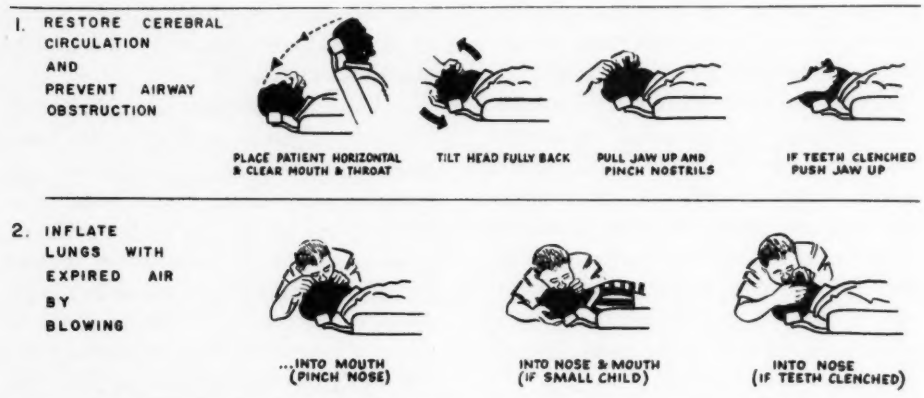
1. RESTORE CEREBRAL CIRCULATION AND PREVENT AIRWAY OBSTRUCTION
PLACE PATIENT HORIZONTAL & CLEAR MOUTH & THROAT
TILT HEAD FULLY BACK
PULL JAW UP AND PINCH NOSTRILS
IF TEETH CLENCHED PUSH JAW UP
2. INFLATE LUNGS WITH EXPIRED AIR BY BLOWING
...INTO MOUTH (PINCH NOSE)
INTO NOSE & MOUTH (IF SMALL CHILD)
INTO NOSE (IF TEETH CLENCHED)

Fig. 1—Direct artificial respiration: the mouth-to-mouth method, for treatment of sudden collapse in the dental chair

pinches the patient's nose and after taking a deep breath he seals his lips around those of the patient and blows air into the patient's lungs until he sees the chest rise. Then he allows the lungs to deflate naturally, and repeats every 4 to 5 seconds. If the patient is a small child, the lips are sealed around the mouth and nose before blowing. When the teeth are clenched, the dentist covers the lips with his hand and blows in through the nose, while making sure that his lips form a tight seal around the patient's upper lip and over the bridge of the nose, otherwise his lips will compress the patient's nostrils and obstruct free air entry.[5] For those dentists who are reticent to apply their mouth to that of their patient in order to perform direct artificial respiration, even when a napkin or towel is interposed, the Brook airway (Fig. 2) has been designed to eliminate direct contact with the patient and to prevent the patient's expired air from returning to the dentist during resuscitation.[6,7] The directions for resuscitation with the Brook airway are shown in Figure 3.

Before inserting the airway, the collapsed patient is placed in the horizontal position and the head tilted fully back. After removing secretions and other foreign matter from the mouth, the airway is inserted over the tongue until the mouth guard is in contact with the lips. While holding the mouth guard firmly against the lips with one hand, the operator pinches the nostrils with the other hand, takes a deep breath and blows into the tube until he sees the chest rise. The chest is allowed to deflate naturally through the expiration vent (no expired air returns to the dentist). Blowing is repeated every 4 to 5 seconds until the patient is revived.

Although other measures are recommended in the management of acute organic disease or local anesthetic reactions, the prime steps in the life-saving

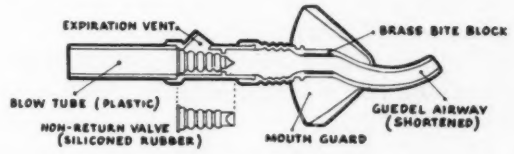

Fig. 2—The Brook airway

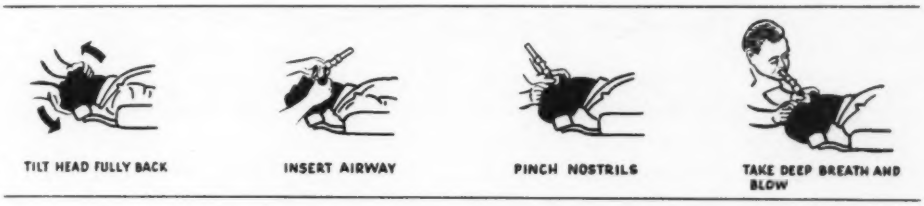

Fig. 3—Direct artificial respiration using the Brook airway

measures are simply: restoration of a clear airway, providing effective respiration and assuring adequate blood flow to the brain and heart. Once these are restored, specific treatment can be undertaken when assistance arrives. If recovery is slow or the patient remains in a stupor, under no circumstances should he be sent home, but he should be kept flat and removed to a hospital for close observation until the underlying condition is diagnosed and recovery is complete.

If these steps are always followed, the dentist will rarely suffer the anguish of a patient's death in his chair. He should also always remember the dictum "for breath too is nutriment"[8] whenever a patient faints or collapses in the chair, regardless of the age, physical condition or cause.

■ *Summary*

Knowledge regarding the management of sudden collapse in the dental chair is vital. Illustrations show the main steps required to avoid serious hypoxic brain damage or death: by proper posturing of the patient, and by direct artificial respiration, using either the mouth-to-mouth, or the mouth-to-Brook airway method. Suction apparatus should always be at hand and ready for use in case the patient vomits during resuscitation or emergence from collapse.

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Healing of surgical extraction wounds in macacus rhesus monkeys: II. The effect of chisels

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Twenty teeth of the macacus rhesus monkeys were surgically removed using chisels for removal of bone. Fragments of bone within the sockets were associated with inflammatory reactions but this was less so than when burs were used for bone removal. Healing appeared to be augmented when the surgical sites were irrigated with saline solution prior to closure, thus removing many of the bony fragments.

When burs are used to remove bone, they produce innumerable small fragments (Fig. 1, left). It is likely that most of these fragments become infected during operations in the mouth; if they remain in the wound, they usually are associated with a marked inflammatory reaction during the first few days so that the organization of the clot is considerably disturbed. Since these fragments are not easily removed, it seems logical that it would be better to prevent their formation as much as possible.

In this respect chisels have a considerable advantage over burs (Fig. 1, right). The bone fragments produced are larger but fewer in number, and many are removed during the operative procedure. The use of chisels also avoids the formation of the obscuring mixture of blood and finely divided bone which is one of the major drawbacks of burs. If they are used skillfully, the removal of bone is a more rapid procedure so that the wound is exposed to infection and other external influences for a shorter time. The liberty of the operator is not restricted by the driving mechanism required by a handpiece, and the cleaning and sterilization of the instruments is extremely simple.

On these grounds it would seem that chisels are to be preferred to burs when their use is practicable.

■ *Experimental Method*

In order to throw further light on this problem, teeth were removed with the aid of chisels from macacus rhesus monkeys to provide material for examination at intervals from three days to eight weeks after extraction. Twenty teeth

were removed and 14 animals were employed.

A flap was reflected on the labial side of the tooth to be removed and sufficient of the external alveolar plate was removed to facilitate the extraction of the tooth. The flap was then sutured into position. Four of the sockets to be examined at intervals from three days to three weeks were syringed with saline solution before suturing. The sockets were examined histologically and compared with those resulting after the use of burs.

■ *Experimental Results*

At three days (Fig. 2, left) the flap was well sutured in position, but, as in the bur wounds, there was necrosis of its free margin. The cut surface of the labial crest was splintered and distorted. Bone fragments between the flap and the alveolar process and others in the coagulum filling the space above the crest had attracted many inflammatory cells. These bone fragments were larger than those produced by burs and were fewer in number. The degree of inflammatory infiltration in the blood clot was much less than when burs were employed.

At one week (Fig. 2, right) the epithelial covering was incomplete. Considerable numbers of inflammatory cells were present in the superficial part of the clot below the epithelial defect but this

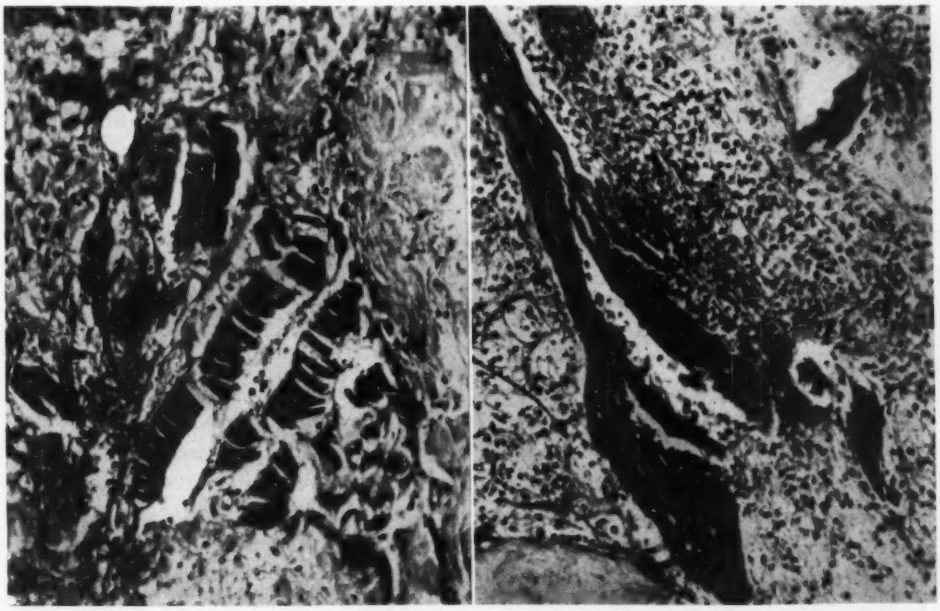

Fig. 1—Left: Fragments of bone produced by bur during surgical extraction. Method of action of bur is clearly demonstrated. Right: Bone fragments removed by chisel during surgical extraction. Lacunae in large fragment are empty and bone is therefore necrotic

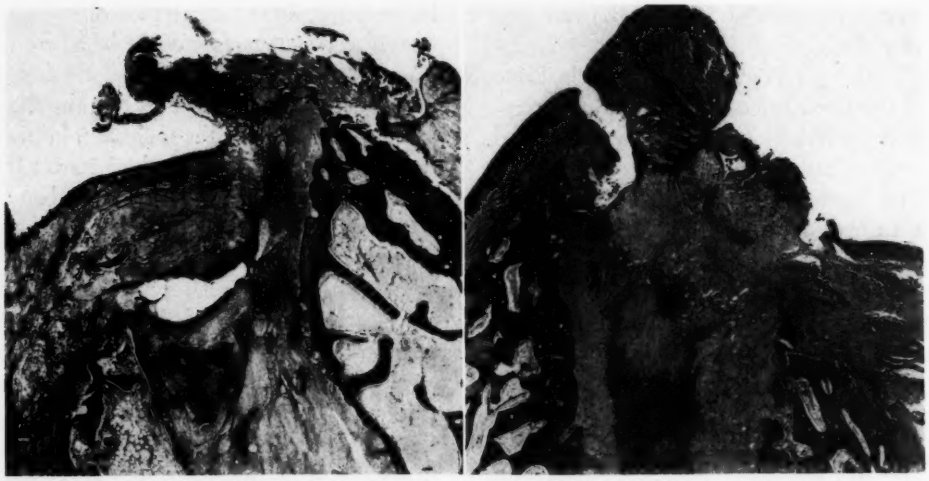

Fig. 2—Left: Three day old surgical (chisel) extraction wound. Flap margins are necrotic. Fragments of bone are seen above splintered labial crest. Right: One week old surgical extraction wound. Gingival margins have been brought together but center of labial flap has necrosed

infiltration extended only a very short distance apically. There were a small number of bone fragments close to the cut alveolar crest and a localized inflammatory infiltration was associated with them. In some places, early osteoblastic activity was evident in the injured bone. There was a small amount of osteoclasia of both crests, especially the lingual one.

At two weeks the syringed wound was well-epithelized, but in the unsyringed wounds (Fig. 3) the thin layer of epithelial cells growing over the surface of the organized clot was not yet complete. Bone fragments continued to attract inflammatory cells, and many were being attacked vigorously by osteoclasts. Some of them were about to be exfoliated. The damaged surface of the buccal crests continued to be repaired by the laying down of appositional bone. In places there was osteoclasia of its external surface. Bone formation in the socket had reached the level of the crests at the sides but was at a much lower level at the center.

From this point the bur and chisel wounds were indistinguishable except that, as in the wounds examined earlier, bone fragments were fewer where chisels were used. At eight weeks the bone appeared to have become almost stabilized so that the surface followed a straight line joining the crests, with a rounding of the socket margins from osteoclasia.

■ *Discussion*

The same considerations apply generally to wounds produced by chisels as to those produced by burs. The differences lie in the action of the instruments on bone. Chisels cut more rapidly and

produce fewer bone fragments. They are less pleasant, however, for the conscious patient and require the momentary application of considerably greater force. The possibility of removing more bone than intended is not very great but pieces of bone may be loosened and left in the wound where they may exert a harmful effect. Chisels cannot burn the bone but they may crush it.

In these experiments many small fragments of bone were found in the wounds but they were not comparable in number with those found in the bur wounds. A certain amount of distortion and splitting of the crests was seen in the sockets at an earlier stage but it is doubtful if any great significance can be attached to this since healing of the cut bone showed no delay. As in the bur wounds, the bone fragments in the early stages were generally associated with inflammatory reactions, but the degree of inflammation was considerably less.

Fig. 3—Two week old surgical (chisel) extraction wound. Epithelization not yet complete. Note circuitous path followed by new epithelium

■ *Summary*

Twenty teeth of macacus rhesus monkeys were removed surgically with the aid of chisels, and the sockets were examined histologically at intervals from three days to eight weeks after extraction.

As in the bur wounds, parts of the flap tended to necrose. Epithelization required between two and three weeks except for a syringed wound in which it was complete at the end of two weeks.

Bone fragments were associated with inflammatory infiltrations during the first few days but the reaction was much less than when burs were used. Otherwise, healing was similar to that observed after the use of burs.

■ *Conclusions*

Chisels produce much smaller numbers of bone fragments than burs, and the inflammatory reaction in the socket during the first few days of healing is much less. Whether burs or chisels are used, the number of bone fragments remaining in the wound can be greatly reduced by syringing with saline solution before suturing.

As in the bur wounds, the bone removed during the operation is not replaced, and the form of the ridge is altered permanently.

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Oral manifestations of idiopathic thrombocytopenic purpura

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Sixty-one patients were treated for idiopathic thrombocytopenic purpura at New Orleans Charity Hospital. Of these patients, 25 showed oral manifestations along with symptoms of purpura. Five sought the services of a dentist first because of the oral manifestations.

The symptoms, pathogenesis, diagnosis, laboratory findings and treatment of the disease are covered.

Two case reports are presented; both patients had a complete recovery after steroid therapy.

In 1735, Werlhof[1] described the disease which presently bears the name of idiopathic thrombocytopenic purpura. It is a comparatively rare disease that is clinically characterized by the extravasation of blood beneath the skin, bleeding from the mucous membranes of the mouth and gastrointestinal tract. Death sometimes occurs from intracranial bleeding. Epistaxis often occurs.[2] In this disease the blood platelet count falls far below the normal, from 400,000 to 600,000 per cubic millimeter to below 100,000. Spontaneous bleeding occurs when the count is below 50,000. This condition is of prime importance to the dentist because, first, he may have an opportunity to discover the disease and second, a knowledge of the illness is essential because of the obvious hazards involved in any surgical procedure.

As the name implies, the cause of this condition still remains obscure. It is to be distinguished from secondary thrombocytopenic purpura which has many known causes, for example, drugs, roentgen rays, radium, radioactive salts, diseases of the blood and blood-forming organs, diseases of the spleen, allergy, and certain systemic diseases.[3]

Haranc[4] advances three possibilities of pathogenesis: (1) excessive destruction of circulating platelets by the spleen as well as diminished production of platelets in the bone marrow by megakaryocytes; (2) an inhibition of delivery of formed platelets to the circulating blood rather than a disturbance in their formation due to a splenic factor; (3) abnormalities of the capillaries which cause the thrombocytopenia by increasing the need for platelets in order to stop the capillary de-

fect. Sprague and co-workers[5] have stated the belief that the plasma of a patient with idiopathic thrombocytopenic purpura contains a thrombocytopenic factor that lowers the level of platelets because of an antigen-antibody reaction and damages the megakaryocytes. Furthermore, the spleen removes sensitized platelets and produces antibodies. They also state that specific platelet groups exist.

■ *Diagnosis*

A positive diagnosis is possible only after a thorough history has been taken and hematological examination (including bone marrow studies) made. It is mandatory to rule out leukemia, pernicious anemia, bone marrow replacement by tumor or nonhematopoietic tissues, hemophilia, hypoprothrombinemia, scurvy, or senility and other related diseases. However, if the patient shows spontaneous purpura, poor clot retraction, and the results of the Rumpel-Leede's test are positive, thrombocytopenic purpura is strongly indicated. Other hematologic findings include a prolonged bleeding time if the platelet count is below 50,000 and a normal clotting time. A reduction in the number of platelets is always present. Many of these tests can be performed with facility in the office.

In thrombocytopenic purpura, clot retraction is poor because the significant decrease in the amount of platelets prevents a normal retraction of the clot. Bleeding time is often increased because of the fact that platelets are needed in bulk to plug a vessel opening and to release vasoconstrictive agents (serotonin). Hence, with decreased platelets, hemorrhage continues for long periods from small blood vessels. Clotting time is normal, as only a small number of platelets are required for local coagulation and thromboplastin can be supplied from the tissue juices.[6] The Rumpel-Leede or tourniquet test is positive because platelets are necessary for preservation of the normal integrity of the capillary wall.

Some of the symptoms that a patient may have include spontaneous bleeding of the gingiva, excessive hemorrhage from tooth extraction, scaling, or toothbrush trauma, and petechiae of the skin or mucosal tissues. The patient is easily bruised, and bruises fail to disappear normally. Menorrhagia is often a common symptom. It has been found that the severity of symptoms is not necessarily proportional to the decrease in platelets, but to the functional quality of the platelets and the integrity of the capillaries.[5]

■ *Incidence*

Over the past five years, at the Charity Hospital, New Orleans, a diagnosis of idiopathic thrombocytopenic purpura was made in 66 patients. Fifty per cent of the instances occurred in children or young adults under 16 years of age. (Sako[7] has reported that the disease is rare in children.) The age range of all 66 patients was from birth to 66 years. Sixty-two per cent were white patients. This is significant since the ratio of Negro patients to white patients is three to one at Charity Hospital. In patients under 16 years of age there seems to be no predominance as to sex; however, in adults, there are twice as many women as men with the disease. It is important to note that 25 of the patients showed oral manifestations (hemorrhage, petechiae, and so

on) along with other symptoms of purpura. Five first sought the services of a dentist since they had only oral manifestations. Two of the patients died and both exhibited cerebral hemorrhage at necropsy.

It would appear that younger patients have a better prognosis, since very often in older patients the disease becomes chronic.

■ *Current Treatment*

Meyers[8] states that in most patients, the use of adrenocorticotropin (ACTH) cortisone and hydrocortisone will alter the bleeding tendency promptly. She outlines the treatment as follows:

ACTH is given in doses of 25 mg. intramuscularly every six hours. Cortisone is used in doses of 150 mg. twice daily or 75 mg. orally every six hours. Hydrocortisone, 100 mg., intravenously twice daily or 50 mg. orally every six hours. Treatment is continued for seven to fourteen days. If the purpura has been of short duration before the institution of treatment and a complete clinical and hematologic remission is attained, the hormone is withdrawn by decrements of 25 per cent of the original daily dose and the patient is observed.

Some authorities feel that prednisone is the drug of choice since it produces fewer side effects. Very often, steroid medication is the only treatment needed to arrest the disease. In our survey, 31 of the 66 patients seen at Charity Hospital obtained remission with steroid therapy alone. If a relapse should occur, then splenectomy is considered as the next step in treatment. Steroids are usually reinstated prior to surgery.

Twenty-five of the 66 patients reviewed underwent splenectomy, and of these, 12 have had no recurrence of purpura to date. In the remaining 13 patients, the purpura became chronic.

In elderly patients it has been found that splenectomy is of little value.[8] Meyers also states that pregnancy does not alter the treatment of this disease.

Transfusion of whole blood or platelets contributes sufficient platelets to meet an emergency caused by massive blood loss, but its effects last only four or five days.[5] A transfusion is not without danger, since the thrombocytes contained in the donor blood may build up platelet antibodies. This reaction becomes greater with each transfusion, as pointed out by Sprague.[5]

In patients with the acute form of the disease, any oral surgical procedure should be deferred until the circulating platelets are adequate. In chronic thrombocytopenic purpura an added hazard arises in that the patient's platelet count will never be sufficient. If the procedure is minor, then blood transfusions should be withheld until capillary hemorrhage cannot be controlled. Uncontrollable hemorrhages may be treated by the administration of whole blood. When a major operative procedure is necessary, whole blood should be given at the time of operation.

In the two case reports herein presented, the primary manifestations of the disease were found in the mouth.

■ *Case 1*

A 19 year old Negro man came to the emergency room at Charity Hospital on April 24, 1958 for treatment of an uncontrollable hemorrhage in the mouth.

The patient stated that his gums had been bleeding for about a month. The condition had been initiated by toothbrush trauma, and was becoming progressively worse. One week previously, his dentist gave him "a mouthwash and two white pills."

PERTINENT HISTORY — The patient stated that his mother had died giving birth to him, (her record is unavailable). He also stated that there is no familial bleeding tendency, that he had no allergies, and that he has not taken any patent medicines or drugs of any sort. The patient had never had a blood transfusion. In 1953 he received three prophylactic injections for malaria, but never contracted the disease. As a child he had received a smallpox vaccination. Except for gingival hemorrhage, the patient stated that he had not experienced any prolonged bleeding up until approximately four weeks previously, nor did he bruise easily.

ORAL AND PHYSICAL EXAMINATION— There were several clots of considerable size distributed throughout the gingiva (Fig. 1). There was also one carious lower molar present. The oropharynx was inflamed, and oral hygiene appeared to be excellent.

Physical examination revealed a well developed, well nourished Negro man, aged 19, in no acute distress. All other physical findings were negative and no evidence of splenomegaly was found. Other physical findings included blood pressure of 120 systolic, 75 diastolic pulse, temperature 102°F., respirations 22, pulse 105.

Fig. 1—Several clots of considerable size can be seen in the gingiva of Case 1

In the emergency room the following laboratory results were obtained: hemoglobin, 13.5 Gm.; red blood cell count, 5,100,000 per cubic millimeter; packed cell volume, 44; white blood cell count, 6,000 per cubic millimeter. The urinalysis was negative; bleeding time, over 15 minutes; clotting time (Lee-White), 9 minutes, and clot retraction, none.

Because of the negative history, prolonged bleeding time and lack of clot retraction, a Rumpel-Leede test was performed. This was accomplished by placing a blood pressure cuff on the upper arm and inflating it to the mean diastolic and systolic pressure. The cuff remained in place for approximately ten minutes. Many more than the required 15 petechia per square inch formed.

A tentative diagnosis of idiopathic thrombocytopenic purpura was made, and the patient was referred to the department of internal medicine for treatment. He was admitted to the hospital and received a complete hematologic examination, including bone marrow studies. Tests revealed a blood platelet count of

Fig. 2—Case 2. Submucosal hemorrhage can be noted on the palate

4,000 per cubic millimeter, and the findings of the tests performed in the emergency room were confirmed. A prothrombin time of 13.8 seconds was found, and bone marrow studies were normal except for the presence of immature megakaryocytes. A positive diagnosis of idiopathic thrombocytopenic purpura was made, and the patient placed on prednisone, 60 mg. per day orally for two weeks.

All bleeding ceased on the second day of medication and by June 12, 1958 he was discharged from the hospital and followed on an out-patient basis. Gradually the steroid dose was reduced until July 1, when all medication was discontinued. On August 15, the patient's platelet count was 275,000 per cubic millimeter, his bleeding time was four minutes and a Rumpel-Leede test was negative for petechiae. He is still being followed at the present time.

■ *Case 2*

On July 23, 1958 a 29 year old Negro woman was first seen by a local dentist for a prophylaxis. After the first tooth was scaled, he was unable to control the hemorrhage. He referred her to a local physician who gave her penicillin. The patient returned to her dentist who noted submucosal hemorrhage on the palate (Fig. 2). At this point he referred the patient to the oral surgery service of Charity Hospital with a tentative diagnosis of a blood dyscrasia.

There was no history of allergy, drug injection, exposure to x-ray, systemic disease, or transfusion. Family history was negative.

PHYSICAL FINDINGS—There were five or six scattered petechia in the superior pectoral region. No splenomegaly was noted. Otherwise the physical examination revealed no abnormalities.

ORAL EXAMINATION—There was a large clot covering the upper left first molar, with an extravasation of blood toward the midline of the palate (Fig. 2). Bleeding time, clotting time, and clot re-

Fig. 3—Case 2. After treatment, there were no manifestations of purpura in oral cavity

traction were determined and a Rumpel-Leede's test performed. The bleeding time was 4 minutes; clotting time, 6 minutes; clot retraction, abnormal. The Rumpel-Leede test was positive.

A tentative diagnosis of idiopathic thrombocytopenic purpura was made and the patient referred to the internal medicine service. This diagnosis was confirmed by a complete hematological examination. The patient was found to have 22,000 platelets per cubic millimeter and the bone marrow was normal.

She was placed on prednisone, 40 mg. per day orally, and followed as an outpatient. All other hematological findings were negative. She was seen again on Sept. 19, 1958 at which time the platelet count was 450,000 per cubic millimeter. At this visit she was seen in the oral surgery service and there were no manifestations of purpura in the oral cavity (Fig. 3). The patient is currently being followed by the hematology department.

■ *Summary*

Idiopathic thrombocytopenic purpura is a comparatively rare disease that is clinically characterized by extravasation of blood beneath the skin. Knowledge regarding it is of prime importance to the dentist because he may have an opportunity to discover the disease and because of the hazards involved in any surgical procedure.

A survey of 66 patients treated at Charity Hospital in the past five years indicates that hemorrhage from the oral cavity is common in this disease. Diagnosis can be made in the dental office, and the patient can be referred to a physician for treatment.

Two case reports are presented in which the primary manifestations of the disease were found in the mouth.—*100 East Fifth Street.*

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■ A Profession

A profession is an occupation requiring preliminary intellectual training, pursued primarily for others and not merely oneself, and accepting as the measure of achievement one's contribution to society rather than individual financial reward.—*Justice Louis D. Brandeis.*

Amyloidosis

■ *Bernard D. Gold, D.M.D., Brooklyn, N. Y.*

The condition known as amyloidosis involves the deposition of a mucopolysaccharide-protein complex extracellularly in different organs and organ systems. Variations of the disease which are associated with other diseases and primary amyloidosis are reviewed with special attention devoted to diagnosis and treatment. Prognosis with regard to primary amyloidosis is not encouraging. Lesions of secondary amyloidosis may heal if the underlying degenerative disease is controlled provided there is no extensive involvement of vital organs.

Amyloidosis is a degenerative disease affecting many different and varied organ systems. Amyloid is not starchlike as the name implies but a mucopolysaccharide-protein complex, the mucopolysaccharide being chondroitin sulfuric acid. It causes injury to cells by accumulating in amounts sufficient to produce pressure atrophy of the cells or by narrowing the lumens of blood vessels so that ischemic degeneration of the tissue occurs.[1] Amyloid is deposited extracellularly in the ground substance of connective tissue, rather than within the cells of an organ.

Grossly, amyloid of any type appears homogeneous, glassy and translucent, transmitting the color of the organ in which it is found. Staining is characteristically homogeneous and eosinophilic, presumably because of the mucopolysaccharide chondroitin sulfuric acid.[2] Staining properties are consistent in secondary amyloidosis as encountered in man, but are much less regular in other forms of the disease.

Iodine in water (Lugol's solution) stains typical amyloid deep brown. Subsequent treatment with dilute sulfuric acid deepens the color to brownish-blue or blue-black. This staining reaction led Virchow to call the substance amyloid (starchlike).

Metachromatic aniline dyes (methyl violet, aniline gentian violet, methyl green) give the best and most consistent method for demonstrating amyloid. With this method, amyloid is stained a rose-red and the tissues are stained the color of the dye.

Congo red stains amyloid intensely pink. The affinity of this dye for amyloid allows it to be used as a clinical test.

Van Gieson's stain colors amyloid yellow or brownish.

■ *Types of Amyloidosis*

There are four major kinds of amyloidosis: secondary amyloidosis, primary systemic amyloidosis, amyloidosis asso-

ciated with multiple myeloma and tumor-forming amyloid.

SECONDARY AMYLOIDOSIS—The most commonly encountered form, secondary amyloidosis, is usually secondary to a chronic, debilitating and suppurative disease (tuberculosis of the lungs and bones, chronic pyogenic osteomyelitis, syphilis, leprosy, lung abscesses and bronchiectasis). It is also seen as a complication of malignant tumors, rheumatoid arthritis, Hodgkin's disease, pyelonephritis and ulcerative colitis. The incidence of secondary amyloidosis has been somewhat reduced in recent years because of the effective control of chronic suppurative disease by antibiotics.

The organs mainly affected are the spleen, kidney, liver and adrenal glands. In these parenchymatous organs, amyloid is deposited primarily in connective tissue and in the walls of arterioles and capillaries beneath endothelial cells.[3] Lymph nodes, gastrointestinal tract, pancreas, thyroid and prostate also may be affected.

Amyloid staining is typical, unlike that encountered in primary amyloidosis.

The spleen is enlarged and firm, the capsule tense. Cut surfaces present a mottled appearance (sago spleen) or less commonly a glassy appearance (bacon spleen). The former is due to deposition of amyloid within and about the malpighian bodies, whereas the latter is due to deposition in the connective tissue of the pulp.

The liver is also enlarged and firm, amyloid being deposited between hepatic cell and sinusoid. Pressure atrophy of the hepatic cells occurs with progressive amyloid formation.

The kidneys may be normal in size or enlarged. Amyloid is deposited within the arterioles of the glomerular tufts.

The adrenal glands may be normal or enlarged, amyloid being deposited in the connective tissue with resultant pressure atrophy of the parenchymal cells.

PRIMARY SYSTEMIC AMYLOIDOSIS—Primary systemic amyloidosis is a rare condition of which there are some 75 cases reported in the literature. Unlike secondary amyloidosis, it is not preceded by another pathological process such as chronic infection. It is not associated with a known disturbance of protein metabolism and does not usually strike the organs affected by secondary amyloidosis.

This form of the disease is characterized by often massive deposition of amyloid in mesodermal tissue. Heart, skeletal muscle, tongue, skin and gastrointestinal tract are classically affected.

Staining of primary amyloid is much less regular than that of the secondary form. The apparent variations in chemical structure have been implicated in the erratic staining properties.

Deposition is between rather than within the muscle fibers. Tissue reaction to deposition may occur in the form of lymphocytic infiltration, foreign body giant cells and amyloid rings around fat cells.[4]

AMYLOID ASSOCIATED WITH MULTIPLE MYELOMA — Amyloidosis associated with multiple myeloma occurs in only 7 to 15 per cent of patients with multiple myeloma. The derivation of amyloid from Bence Jones and other related proteins in multiple myeloma has been mentioned as

a possibility.[5] Distribution among organ systems resembles primary systemic amyloidosis more than the secondary form; skeletal muscle especially is involved. In staining too, this form of the disease more closely resembles the primary form, although the staining can be like that in either primary or secondary amyloidosis.[6]

TUMOR-FORMING AMYLOID—Tumor-forming amyloid is a rare phenomenon of unknown etiology. Amyloid tumors may occur as isolated growths in the larynx, tongue, nasal septum, trachea and bronchi. These may have been connective tissue tumors that have become permeated with amyloid. Staining may be atypical.

■ *Clinical Effects and Diagnosis*

Symptoms are extremely variable depending on which organ is affected and the degree to which it has been damaged. Thus, the patient may have renal, cardiac, hepatic or adrenal failure or may be clinically asymptomatic.

The onset and progression of the disease are insidious. Secondary amyloidosis can be seen at almost any age, depending on the inciting disease which itself overshadows the clinical picture of the amyloidosis. If the kidney is affected, amyloid disease will be noted with the onset of albuminurea, edema and hypercholesterolemia. Indeed secondary amyloidosis is the leading cause of death in leprosy because of renal involvement.[7] Liver involvement results in hepatomegaly, but liver failure is usually not seen. Enlargement of the spleen or adrenal failure is not usually observed.

The diagnosis of secondary amyloidosis as a complication of a suppurative disease should be considered, especially if symptoms of renal failure appear. Diagnosis is made by: (1) biopsy of gingiva, muscle, skin; (2) needle biopsy of liver or kidney, or (3) Congo red test (considered positive if 90 per cent of the injected dye is removed from the blood in one hour).

However, the Congo red test will be positive only if there are large amyloid deposits in the liver. Deposits in the kidneys are not sufficient to give positive results. Untoward reactions to Congo red have also been noticed, and the test is contraindicated if extensive skin deposits of amyloid are present.

Needle biopsy of liver or kidney presents the possibility of internal hemorrhage and thus gingival biopsy, if feasible, appears to be the diagnostic aid of choice.

Primary systemic amyloidosis is seen in both men and women between the ages of 40 and 80. The symptoms are congestive heart failure, macroglossia, asthenia, watery diarrhea, and weight loss in later stages. Joint pain, hypertension, lymphadenopathy and purpura may occur. Diagnosis of primary systemic amyloidosis may present difficulties because cardiac involvement closely resembles that of arteriosclerotic heart disease and because the inconsistent staining properties make the Congo red test and microscopic examination of biopsy sites inconclusive.

Amyloid tumors of the larynx may cause hoarseness or obstructive dyspnea. Visualization is accomplished by laryngoscopy and diagnosis by biopsy.[3]

■ *Prognosis and Treatment*

Death usually follows the onset of symptoms in primary systemic amyloidosis in about three years; treatment of the con-

dition is symptomatic only, and the cause of death is heart failure.

In secondary amyloidosis, death is due to renal failure. Therapy is aimed at control of the inciting disease. Healing of the lesions may occur if there is not extensive involvement. Although months or years after the onset of the underlying disorders are usually required for secondary amyloidosis to become manifest, some patients have shown amyloid lesions within several weeks after the onset of the suppurative process.[8]

■ *The Nature of Amyloid*

The variability of staining reactions suggests that amyloid is not a single chemical substance, but a series of closely related compounds.[9] The etiology of amyloid is uncertain. Secondary amyloidosis is considered to result from the storage of incomplete or abnormal protein breakdown products arising from areas of tissue damage or destruction.

In experimental animals, amyloidosis is produced by:

1. Prolonged immunization of horses with diphtheria toxins.[9]

2. Subcutaneous injection of sodium caseinate in mice, enhanced by giving mice a diet of increased protein and inhibited by feeding them a diet with high carbohydrate content.[10]

3. Feeding excessive amounts of cheese and other proteins to mice.[9]

In all three experimental conditions, a hyperglobulinemia is present. Some investigators have correlated secondary amyloidosis with disturbed protein metabolism associated with suppuration and tissue breakdown.

The actual mechanism of formation of amyloid is unknown. Some proposed hypotheses are that: (1) the reticuloendothelial system is active in amyloid formation; (2) amyloid is a type of antigen-antibody precipitate; (3) amyloid is found in conditions characterized by hyperglobulinemia.

However, the only definite conclusion is that amyloidosis is associated with some disturbance of protein metabolism. The disease appears not to be a single entity; the chemical composition of amyloid is unknown, and the etiology of the disease uncertain. The prognosis is poor inasmuch as the disease is fatal except in those instances of secondary amyloidosis where the inciting disease is brought under control before failure of affected organ systems has occurred.—*158 East Ninety-sixth Street.*

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Primary amyloid disease: review of the literature and report of a case

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Amyloidosis is characterized by an irreversible and progressive deposition of glycoprotein in various tissues. It usually occurs in patients over 50 years old and is twice as prevalent in men as in women. Oral, gingival and cervical alterations may appear early and provide a good opportunity for diagnostic biopsy. The diagnosis is based mainly on histologic staining reactions and at present there is no satisfactory treatment. The patients usually do not live longer than three years. The case report of a 50 year old woman with early oral involvement is included in this paper.

Amyloidosis is a disorder characterized by an abnormal deposition of a glycoprotein substance in various tissues.[1] The initial symptoms may be closely associated with oral complaints. The purpose of this paper is to review this disease entity and present a case report citing early oral symptoms and dental implications.

The disease has been classified on a clinicopathological basis by Reimann, Koucky, and Eklund[2] in the following manner:

1. Primary amyloidosis. In this form the disease is not associated with any obvious predisposing disease. Cardiac, skeletal and smooth muscles are the most common sites of deposition.

2. Secondary amyloidosis. The condition is associated with chronic suppurative diseases of the lung and bone such as tuberculosis and infected malignancies. The spleen, kidney, liver and adrenal cortex are the common sites of infiltration.

3. Tumor forming amyloidosis. Solitary or multiple masses may occur without evidence of generalized disease.

4. Amyloidosis associated with myelomatosis.

■ *Occurrence, Signs and Symptoms*

The incidence appears to be about twice as great in men as in women. Although the disease may occur at any age, the diagnosis is usually made in patients over 50 years old.

Although only about 150 cases of primary amyloidosis have been reported in the literature, there is an indication of a much higher incidence of the disease.

Symmers[3] is of the opinion that since frequently the condition is not discovered until necropsy, there are many more instances that have been missed or not reported.

Progressive heart failure is the most common complication with the gastrointestinal tract second as a site of symptomatic involvement.[3,4] Symptoms may include epigastric distress, arthralgias, purpura, hypertension, lymphadenopathy and weight loss. The tongue is enlarged in roughly one half of the case reports reviewed. Salivary gland infiltration with complaint of a dry mouth is not uncommon. In approximately 25 per cent of the patients, nodular infiltration of the skin occurred.[3,5]

■ *Etiology and Pathology*

Theories as to the cause of amyloid formation include the following:

1. Excessive stimulation of the antibody-forming mechanism.[6] It has been suggested that it may be an autosensitization response.[3]

2. Hormonal dysfunctions which have been noted during the course of the disease.

3. Relationship to hyperglobulinemia and protein metabolism.

4. Incrimination of the plasma cell as noted in myelomatosis.[7]

5. Dysfunction of the reticuloendothelial system.[8]

Both polysaccharide and protein elements are present in amyloid material. It is still questionable, however, whether the material is produced locally, transported to the site of deposition or is a normal tissue component present in amounts too great for utilization.[6,9] Although amyloid deposits have many common histologic characteristics, the chemical characteristics of the deposits may be highly variable.[10]

■ *Diagnosis*

A diagnosis of amyloidosis is based chiefly on the affinity of the glycoprotein material for various dyes in histologic preparations. The most commonly used tissue stains are: Congo red which stains the material red, and methyl violet which produces a metachromatic red-purple when combined with amyloid.[11] The Congo red intravenous test is considered positive for amyloid if over 90 per cent of the injected dye is removed from the blood in one hour. This test is rarely positive in the primary form of the disease.[5] Biopsy of grossly normal appearing gingiva has been reported[12,13] to be positive for amyloid in patients in whom generalized disease is present. However, our experience in the biopsy of normal appearing gingiva or tongue in patients with known amyloid disease has not revealed evidence of involvement. Biopsies of gingiva and especially the tongue may be too superficial and miss the underlying deposits.[3]

■ *Treatment*

Treatment of primary amyloidosis has not been satisfactory. Both corticotropin and cortisone have been used in selected instances with inconsistent results.[11,12,14-16] In cases reported responding to treatment, only temporary symptomatic relief was obtained. Recovery from the primary disease has not been observed and the expected life span after diagnosis does not exceed three years. Symmers[3]

cites instances of hormonal dysfunction associated with this disease and suggests that thyroid extract deserves a trial.

■ *Report of Case*

A 50 year old divorced Negro woman was referred to the University of California Dental Medicine Clinic by her local dentist because of bizarre gingival symptoms on March 11, 1958.

History revealed that she had been well until two years previously when the lower right third molar had been extracted. The day after the extraction she noted "blood blisters" covering her gingiva which would break and leave small ulcerations. Within two weeks the ulcerations disappeared and painless nodules developed within her lower lip. Three weeks after the onset her face "swelled up" predominantly on the right side with periorbital edema and considerable injection of both scleras. She would awaken in the morning with nuchal-occipital headaches and experience considerable photophobia. The cervical and submaxillary nodes became enlarged but were nontender. She lost her appetite and had abdominal discomfort in the epigastric region. She also noted that her voice changed to a nasal twang and her nose was chronically stuffy. These symptoms continued for five months at which time she went to a physician who gave her two "shots" in the arm and suggested she have roentgenotherapy. Instead she went to a local dentist who extracted several teeth. After the extractions her face again swelled but subsided more quickly. Also, she developed a nodule over the first right metacarpophalangeal joint.

During the following year she visited two other physicians who performed diagnostic tests including complete blood count and urinalysis, and who also took skull films. She was treated with mouth rinses and various pills, including a ten day course of prednisone. One month prior to being seen in the University of California Dental Medicine Clinic she contacted the referring dentist about replacement of her missing teeth. He advised a diagnostic evaluation preparatory to any restorative work.

The patient stated that she was allergic to both penicillin and procaine, and she felt that the onset of her disease was associated with the procaine used for her dental work. She admitted to an 18 pound weight loss in the last two years, falling from 150 lbs. to 132 lbs. Head and neck examination revealed the following:

Temperature: 36.8°C; pulse 110; respiration 20.

Teeth: Several missing with the remaining teeth firm, but in poor repair.

Tongue: Normal size and contour.

Gingiva: Granulomatous in appearance with a tendency toward petechial bleeding to slight pressure (Fig. 1, left).

Palate: Minute granular "pearls" of material on hard palate not readily removed by scraping.

Buccal mucosa: Normal.

Floor of mouth: Sublingual glands raised, hard, and painless. Scanty saliva flow from submaxillary ducts.

Lips: The lower lip contains numerous nodular grey-white bodies, pea-sized, firm but nontender (Fig. 1, right).

Throat: Appears clear.

Neck: Submandibular glands enlarged, firm and nontender. Superficial

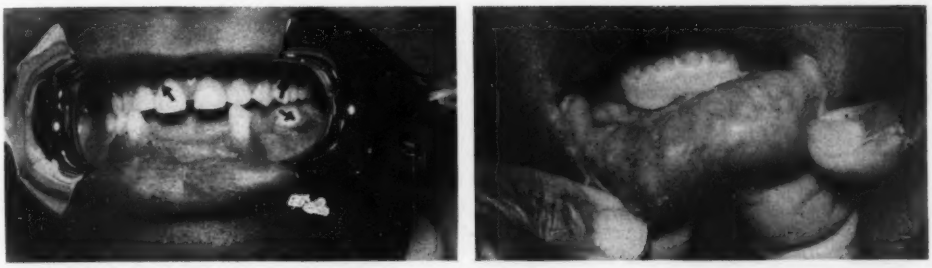


Fig. 1—Left: Arrows indicate some of the granulomatous lesions of the gingiva. Right: Submucosal nodules give mucosa of lower lip a cobblestone appearance

superior cervical, submandibular and submental nodes firm, nonfixed and nontender, 1 to 2 cm. in diameter.

Eyes: Periorbital swelling with injected sclera and conjunctiva. Exhibits extreme photophobia.

Skin: Numerous subcutaneous pale, firm, movable nodules about face, neck and supraclavicular fossae. One firm nodule appears on the right first metacarpophalangeal joint.

Dental films: Moderate generalized bony demineralization with intact lamina dura, increase in prominence of trabeculation, multiple caries and residual root fragment.

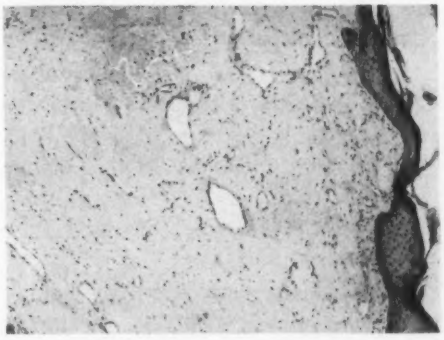
At this time the differential diagnoses included sarcoidosis, lymphoma and amyloidosis. A complete blood count and bleeding and clotting time were within normal limits, and the serologic test was nonreactive. Biopsies were performed of the lower anterior gingiva and a nodule in the lower labial mucosa. Both tissue sections showed amyloid deposition with methyl violet and Congo red stains (Fig. 2).

Because of the obvious generalized nature of her disease, the patient was referred to the medical clinics for further evaluation. In addition to the foregoing findings, the general physical examination revealed the following:

Thorax: Breasts nodular and slightly painful to palpation. Lungs clear to percussion and auscultation.

Heart: Regular rhythm. Not enlarged. Grade 1 basal systolic murmur, not transmitted.

Fig. 2—Sections from biopsy of lower anterior gingiva reveal essentially normal appearing epithelium. In underlying connective tissue numerous thin walled vessels appear with few inflammatory cells. Intercellular areas appear filled with homogenous material which stains a bright pink with Congo red and reddish-purple with methyl violet



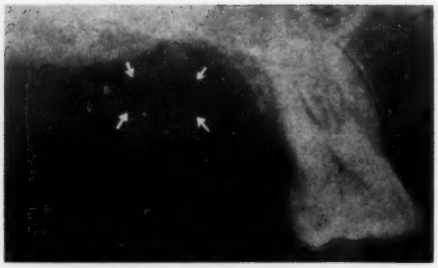


Fig. 3—View of right maxillary tuberosity reveals bone to be radiolucent with few trabeculations

Abdomen: Soft with no tenderness or masses. Liver not felt but spleen appears to be three fingerbreadths enlarged.

Pelvic and rectal: Cervix friable and bleeds at slightest touch. Three small nodules arise from cervix anteriorly which are not movable and are painless. Rectal examination within normal limits.

Central nervous system: Normal for age.

Laboratory tests were performed which showed the following:

Electrocardiogram: Within normal limits.

Chest film: Patchy linear densities in the right upper lobe consistent with chronic inflammatory disease.

Skull and shoulder films: Normal.

Lupus erythematosus cell preparations (3): Negative.

Urinalysis: Within normal limits.

Creatinine clearance: Within normal limits.

Glucose tolerance: Within normal limits.

Prothrombin time: 89 per cent of normal.

ACTH tolerance tests: Normal.

Total protein: 7.8 Gm. per 100 cc. with electrophoretic pattern showing increase in gamma globulin fraction.

Cephalin flocculation: Normal.

Bromosulphalein retention: Normal.

Thymol turbidity: Normal.

A skin biopsy was done of one of the facial nodules. This also revealed amyloid infiltration.

Because of the positive biopsies and failure to find other significant pathologic conditions, the patient was discharged with a diagnosis of primary amyloidosis. No treatment was prescribed.

On September 2, 1958, the patient reported with a chief complaint of pain in right maxillary tuberosity region. She appeared much thinner than six months previously. Her weight at this time was 117 pounds which amounted to a 15 pound loss. She associated her pain with the upper right first molar. Examination revealed a severe periodontal involvement of the tooth. A roentgenogram showed loss of trabecular pattern in the tuberosity (Fig. 3). The tooth was removed along with a wedge of tissue in the tuberosity. Healing was slow but uncomplicated. Microscopic examination of the tissue revealed scattered bony spicules with predominance of amyloid infiltration.

On December 19, 1958, the patient returned because of bleeding from the oral lesions and progressive pain. Her lips were dry, protruded and cracked. She appeared very weak and depressed and stated that she was unable to leave her bed most of the time. The nodular masses in the neck were increasing in size and extending into the upper right arm. Her weight had decreased to 109 pounds or an additional eight pound weight loss in three months.

Supportive treatment consisted of a protein-vitamin dietary supplement, aspirin compound for pain, and a lubricating ointment for the lips.

The patient expired in November 1959. Postmortem examination confirmed the clinical diagnosis of primary amyloidosis.

■ *Discussion and Summary*

Primary amyloid disease is manifested by an irreversible and progressive glycoprotein infiltration of most body tissues causing many variable signs and symptoms. The diagnosis is based on histologic staining reactions and on the ruling out of other contributory or associated disease. There is no satisfactory treatment, and the patient, after detectable onset, ordinarily does not live longer than three years. Some data indicate that the disease might be more prevalent than the approximately 150 cases reported.

A 50 year old Negro woman with apparent primary amyloidosis of about two and a half years' duration was seen. Among her early symptoms were gingival and oral mucosa involvements and cervical adenopathy which prompted dental consultation. This gives the dentist an opportunity to play a significant role in the detection of the disease and subsequent diagnosis. The importance of a thorough examination, differential diagnosis, and proper use of laboratory and diagnostic technics are stressed.

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■ Magic and Science

Magic is essentially unprogressive and conservative; science is essentially progressive; the former goes backward; the latter, forward.—*George Sarton, Introduction to the History of Science.*

Preliminary report on the effects of parabromdylamine maleate and methocarbamol after oral surgical procedures

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Reports of many investigations into the effectiveness of antihistamines in relieving postoperative edema after the removal of impacted third molars have appeared in the literature in recent years. A preliminary study utilizing parabromdylamine maleate indicates that this drug is definitely beneficial in reducing edema after various types of intraoral surgical procedures. The combined use of parabromdylamine and methocarbamol appears to be of value in reducing edema and trismus after the removal of third molars. The results warrant further study of both drugs.

Over the past few years a number of reports have appeared in the literature which discuss the value of antihistamines in the reduction of postoperative sequelae after oral surgical procedures.[1-5] In addition, the use of a skeletal muscle relaxant has found some advocates in the prevention or reduction of trismus after third molar extractions.[6]

The physiologic effect or the pharmacology of these drugs will not be discussed in this paper; rather, our results using the antihistamine, parabromdylamine maleate, and the muscle relaxant, methocarbamol, will be reported.

■ *Method*

Our experiment was designed to evaluate the effects of parabromdylamine maleate and methocarbamol in the reduction of postoperative swelling and trismus after oral surgical procedures. As an incidental finding, reports of pain were included in our report.

One hundred and twenty-two patients participated in this study. They were arbitrarily divided into three groups as shown in Table 1. Group A received parabromdylamine maleate, 1 tablet twice a day. Group B received placebos and Group C were controls who received no medication. The third molar extractions were likewise divided, with the exception that the Group A patients received metho-

Table 1

General distribution of patients and distribution according to surgical procedures

	Group A Received medication	Group B Placebos	Group C Control
Male	16	16	18
Female	25	24	23
Age	16–70 (av. 31)	16–67 (av. 34)	16–72 (av. 32)
Sub. total	41	40	41
Third molar extractions	23	24	25
Other	18	16	16
Multiple extractions	8	7	6
Root resection	2	3	3
Extensive alveoloplasty	2	3	3
Mandibular bicuspid impaction	2	3	3
Maxillary cuspid impaction	2	0	0
Biopsy	2	0	0
Sub. total	41	40	41
Total number of patients—122			

carbamol, 2 tablets four times a day, in addition to the parabromdylamine maleate.

The parabromdylamine maleate was in the form of "Extentabs" 12 mg. The methocarbamol tablets contain 0.5 Gm. of the drug.

All medication was started 24 hours before surgery and continued for 48 hours postoperatively. After surgery, at least one no. 0000 black silk suture was placed at the operative site. The patients were instructed to return on the third postoperative day for suture removal and evaluation. In addition, the patients were instructed to take all the tablets given them, and no other medication such as analgesics was prescribed. Only those patients who took full doses as issued to them are included in this report. Controls were told to take an analgesic tablet every four hours, if needed, for severe discomfort.

All of the procedures were performed in the department of oral surgery, Chicago College of Dental Surgery, Loyola University School of Dentistry.

■ *Results*

The results of the study are summarized in Tables 2 and 3. It can be seen from Table 2 that parabromdylamine maleate appeared to have a definite beneficial effect in the reduction of swelling. Of those patients receiving this antihistamine, 66 per cent reported no swelling; compared to this, only 35 per cent of the patients in Group B who received placebos and 41 per cent of the controls reported no swelling. With reference to a decrease in pain, no remarkable differences were reported by the patients in the three groups.

Of the 72 patients who required mandibular third molar extractions and who participated in the methocarbamol phase of the experiment, 61 per cent reported no swelling as compared with 21

Table 2

Incidence of swelling, trismus and pain in patients participating in parabromdylamine maleate phase of study

		Group A	Group B	Group C
Swelling	Present	14 (34%)	26 (65%)	24 (59%)
	None	27 (66%)	14 (35%)	17 (41%)
Trismus	Present	(See Table 3)		
	None			
Pain	Present	24 (59%)	28 (70%)	28 (69%)
	None	17 (41%)	12 (30%)	13 (32%)

per cent of Group B, and 20 per cent of Group C. This compared favorably with the results shown in Table 2.

Of the patients in Group A, 74 per cent reported no trismus as compared with 38 per cent of those in Group B and 20 per cent of Group C. This shows methocarbamol to be of value in the reduction of postoperative trismus after mandibular third molar extractions. It is interesting to note that 35 per cent of the patients in Group A reported no pain as against 8 per cent for Groups B and C. It is our feeling that much of the pain associated with third molar extractions is the result of the trismus secondary to the tissue trauma associated with surgical procedures. There appeared to be little, if any, correlation between swelling and trismus, or for that matter, swelling and pain.

■ *Summary*

A clinical evaluation of the effects of parabromdylamine and methocarbamol was made utilizing 122 clinic patients. The antihistamine parabromdylamine maleate was found to have definite beneficial effects in the reduction of postoperative swelling. In the reduction of postoperative trismus after the extraction of mandibular third molars, the muscle re-

Table 3

Results of mandibular third molar extractions

		Group A*	Group B	Group C
Swelling	Present	9 (39%)	19 (79%)	20 (80%)
	None	14 (61%)	5 (21%)	5 (20%)
Trismus	Present	6 (26%)	15 (62%)	20 (80%)
	None	17 (74%)	9 (38%)	5 (20%)
Pain	Present	15 (65%)	22 (92%)	23 (92%)
	None	8 (35%)	2 (8%)	2 (8%)

*The patients in Group A received methocarbamol in addition to parabromdylamine maleate.

laxant methocarbamol was found to exert a favorable influence. The results warrant further study in the use of antihistamines and muscle relaxants in the reduction of postoperative sequelae after oral surgery.

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Dimetane Extentabs and Robaxin Tablets supplied by A. H. Robins Co., Inc., Richmond, Va.

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Prophylactic use of tetracycline after removal of impacted teeth

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The use of tetracycline after extraction of impacted mandibular third molars may tend to prevent or retard the development of alveolar osteitis. The incidence of this complication was less when compared with the reported incidence as quoted in other studies.

In the past decade many clinical studies of chemotherapeutic agents have been conducted in an attempt to find an ideal method for reducing significantly infections after dentoalveolar surgery. In all studies of postextraction infection, the highest incidence has been found to occur after removal of mandibular molars, and of these, the third molars are most frequently involved.

Of the various complications seen after surgical removal of mandibular third molars, localized alveolar osteitis (dry socket) is encountered most commonly. This well-known complication may be described as the postoperative condition of the tooth socket in which the clot either does not form or is lost from infectious or mechanical causes. The diagnosis usually is made between the second and fourth postoperative days.[1,2] Severe, boring, steady, radiating pain and foul odor are the most prominent symptoms. Any of a large variety of empirically designed medicated dressings placed in the socket usually will alleviate pain and promote healing.[3,4]

■ *Purpose of the Study*

Most authors agree that if no type of prophylactic chemotherapy is used,

roughly one fifth to one third of operations for removal of impacted lower third molars will be followed by postoperative complications, mainly localized alveolar osteitis.[4,5] A study made by Linn[5] in 1954 at the School of Dentistry, University of Minnesota, revealed a 19 per cent incidence of osteitis in 79 such patients when no prophylactic medication was used.

Although chemotherapeutic agents have been used locally and systemically with varying degrees of success, relatively few articles have appeared describing studies involving the use of the newer wide-spectrum antibiotics systemically for prophylaxis against postextraction infection. DiConza,[1] in 1953, using oxytetracycline (Terramycin) 250 mg. every four hours for 24 hours postoperatively in 110 patients requiring removal of mandibular third molars, reported that only four sedative dressings were required because of localized alveolar osteitis. A control group of 112 patients required 96 sedative dressings.[1]

The purpose of this study was to observe the effectiveness of systemic administration of tetracycline HCl in reducing the incidence of localized alveolar osteitis after impacted third molar removal. Tetracycline was selected because of its effectiveness against a wide range of oral bacteria, its ease of administration by the oral route, and its relative freedom from serious toxic effects.

■ *Experimental Procedure*

Only those operations involving mandibular third molars were used, 50 per cent of which also included the upper third molars. Since maxillary third molar odontectomy generally is followed by uneventful healing, it was not believed that these additional surgical procedures would alter the results to any discernible degree.

The operations were performed over a period of nine months by four graduate students, each with varying amounts of experience in oral surgery.

Although the antibiotic was prescribed for all patients undergoing operations for removal of impacted third molars, only those which required bone removal were included in this study. After determining from the history that no contraindication existed, each patient was given a prescription for 12 capsules of tetracycline HCl, 250 mg. each, with instructions to take one every six hours with milk or juice until all capsules had been taken. The first dose was given in the clinic immediately prior to surgery, along with ethinamate 0.5 Gm. and acetylsalicylic acid 0.6 Gm.

The anesthetic used in the study was lidocaine hydrochloride 2 per cent, with 1:50,000 epinephrine.

In each instance the operation was performed by raising a mucoperiosteal flap, removing overlying bone with a bur, then elevating the tooth intact or sectioning it with a chisel or bur, as indicated. Debridement, roentgenographic examination, and suturing were followed by excision of a small wedge of tissue distal to the second molar in order to provide drainage.

All patients were instructed to return for observation and routine postoperative care in four to seven days unless progressive pain, unresolved swelling, hemorrhage, or other complication de-

veloped, in which case they were to return immediately.

Patients who developed localized alveolar osteitis were treated in the traditional manner by placement of sedative dressings, repeated as necessary.

Postoperative notes were made by graduate students, senior students, and staff.

■ *Results*

One hundred and fifty-four patients undergoing removal of impacted mandibular third molars procured the capsules, took the full course of treatment, and returned for at least one postoperative visit. Approximately 100 additional patients were excluded from the study because the record failed to state whether the prescription was filled and all capsules taken as directed, because of recorded failure to take the full course of treatment, or because direct observation was not possible, as in the case of out-of-town patients who had been referred for surgery and who returned to their family dentist for postoperative care.

Forty-eight per cent of the patients were men and 52 per cent women; approximately two thirds (61 per cent) were between 20 and 30 years of age.

Of the 154 patients, 16 (10.4 per cent) had symptoms of localized alveolar osteitis and required sedative dressings. Of the 16, seven developed osteitis in the first postoperative week and the remaining nine in the second week. Two patients developed postoperative abscesses, one in the third week and the other three months postoperatively. The latter patient had previously received Ward's packs for localized osteitis.

Three patients developed nausea, all on the third day. No vomiting, diarrhea, anal pruritis, or other side effects were encountered.

■ *Discussion*

This report is presented as the result of the clinical trial of a drug in an oral surgery teaching clinic. The study was attended by all of the usual problems common to such an environment. It is not intended to represent a well-controlled double-blind research project, and the results must be viewed with reservation. However, with due recognition of the limitations and shortcomings of the investigation, two points of interest were noted which were felt to justify this report: an apparent reduction in the expected percentage incidence of osteitis, and the rather striking delay in onset in over half the patients in whom it did occur.

On the first point, it should be noted that dry socket was not completely eliminated. The lack of a control series makes it impossible to know whether a true preventive effect was achieved. In an untreated group in the same clinic five years previously, Linn[5] found a 19 per cent incidence, which, when compared with the 10 per cent in this study, suggests a reduction by about one half. The large number of variables involved does not justify presenting this as a valid observation, however. Repetition of the study using the double-blind technic, with groups receiving the medication in various sized doses and for varying periods of time, and with a placebo control group, is indicated.

On the second point, the delayed

onset, a suppressive or masking effect by the antibiotic is suggested.

The moderate size of the dose and brief period of treatment were selected arbitrarily after consideration of the matter of cost, and the possibility of producing intestinal moniliasis or staphylococcal enteritis. The virtual absence of intestinal side effects was gratifying. In this connection the experience of Grimm and co-workers[6] in 1952 with chlortetracycline for the treatment of active oral infections is of interest. He found that higher doses gave superior results but resulted in a higher percentage of side effects as well.

■ *Summary and Conclusions*

Oral tetracycline HCl, 1.0 Gm. per day, was administered for the first three postoperative days to 154 patients undergoing impacted lower third molar odontectomy in which bone removal was required.

There was an incidence of localized alveolar osteitis in 10.4 per cent of the patients. Over half of the instances were first noted in the second postoperative week. The effects were interpreted as a partially preventive and partially suppressive action by the antibiotic.

No significant side effects or complications resulting from the drug were encountered.

Further studies with a control group and with varying amounts of the medication are indicated.

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■ Education for Personal Effectiveness

There can be no more important education today than education for personal effectiveness and a sense of connection with big events. A truly educated person is one who has reasonable knowledge, if not command, of his environment, who performs those acts that relevant to his well-being and the well-being of the people around him, who is able to think about and to anticipate the effects of causes. However impressive a man's acquisition of worldly knowledge, however proficient his ability to marry theory to technique, if he cannot use his thinking ability and his skills to work for a safer and better world, his education is incomplete and he is in trouble.—*Norman Cousins. Education Against Helplessness. Saturday Review, March 19, 1960.*

The role of prepayment in the individual dental practice

■ *Irvin V. Uhler,* D.D.S., Lancaster, Pa.*

The author's seven years of experience with prepayment plans are summarized. Joint, long-range studies of prepayment dental insurance programs should be made by actuarial and dental personnel. Prepayment plans should be expanded as practicability becomes evident, and individual participation should be encouraged where circumstances preclude group participation. Uninsurable catastrophic dental health costs should be alleviated by interest-free financing plans.

The role that prepayment plans will play in individual dental practice in the future is not clear. There are several vague forms beginning to become distinguishable, but up to the present, mainly surgical problems have been covered by plans, and some more or less vague scattered allowances. To reach any kind of a goal of insurance coverage will be a longtime procedure which will tax the intelligence and abilities of the insurance and dental professions alike. Dental disease by nature is a separate entity, and for all purposes it may be considered as without a beginning or ending. For this reason alone, it will call for much understanding and teamwork between the insurance carrier and the dentist.

Dentists must become familiar with financial reserves, premium determinations, evaluation and granting of benefits, and must understand the difficult problem facing the actuary who tries to cover large groups. The actuaries in turn must come into dental offices and into hospitals and familiarize themselves with the overall picture of dental disease. They must learn about the aging phases of the human dentition, and the ever-changing problems as the patient moves from decade to decade. Once a common understanding is reached regarding each other's problems and aims for the public, the two professions together can determine what the public may expect in the way of insurance for dental health service, and to what they are properly entitled. As a starting point in this discussion, I will use as a base my last seven years' experience with prepayment plans, and general experience covering ten years of general practice and 12 years in a specialty.

■ *Analysis of Income*

In 1953, 30.80 per cent of our total gross income was derived from hospitalized patients. Of this, Blue Shield paid 3.09 per cent and commercial plans 2.63 per cent.[1]

In 1954, our income from hospitalized patients amounted to 39.22 per cent

of our gross income, 4.76 per cent being paid by Blue Shield and 5.26 per cent by commercial plans.[1]

In 1955, we find that hospitalized patients provided 42.79 per cent of our gross income, Blue Shield paying 4.16 per cent and commercial plans 5.71 per cent.[1]

In 1956, our hospitalization portion of gross income rose to 50.50 per cent, with Blue Shield paying 9.60 per cent and commercial plans 7.50 per cent.[1]

In 1957, the hospitalization portion of our gross receipts dropped to 43.55 per cent, with Blue Shield paying 11.39 per cent and commercial plans providing 9.46 per cent.[1]

In 1958, 56.93 per cent of our income was derived from hospitalized patients, 14.27 per cent provided by Blue Shield and 12.32 per cent from commercial carriers.

In 1959, a high of 58.12 per cent of income from hospitalized patients was reached, 15.18 per cent being paid by Blue Shield and 13.09 per cent by commercial companies.

These figures show an increasing use of hospital facilities which is due in part to policy requirements of underwriters. I would estimate that approximately 45 per cent of these surgical procedures could have been done in the dental office, but there would be the problem of depriving the patient of benefits. An increase of 12.09 per cent in Blue Shield coverage and 10.46 per cent in commercial coverage can be noted in the seven year period. It is of interest to note the increase in Blue Shield coverage, for in our area this plan is very weak in membership when compared with other areas of Pennsylvania. Thus far, benefits are in the main limited to oral surgery done in an accredited hospital. In the foreseeable future, it is possible that other types of dentistry will be included. In our own section, there is increasing demand for management of pediatric dental problems under general anesthesia, and a pediatric dental surgeon has been added to the dental staff of the Lancaster General Hospital.

■ *Prepayment and the Dental Practice of the Future*

To envision the effect of prepayment plans on dental practices of the future is a complicated matter, taxing to the imagination. Moen[2] estimates that by 1967, 55 per cent of the population will be seeking dental care as against 45 per cent in 1955. In the period since my entry into the profession, the ratio of practitioners to patients has increased from 1 to 1,600 to 1 to 1,900. The dental profession is faced with the problem of more people seeking care from a profession which is losing available manpower. In 1956, the average waiting time for a dental appointment was 12.8 days. A situation such as this may lead to many evils, not the least of which may be inflation. The age of the high speed dental handpiece has eliminated effectively the suggested use of auxiliary personnel in some phases of operative dentistry, to conserve professional manpower.

The public is rapidly approaching the point that it no longer feels financial responsibility for medical health costs, and yet, because of the universal nature of dental disease, it is a question whether it is insurable.

There are too many dental disorders which recur constantly. Caries is a certainty, as is the periodontal problem. These conditions must be treated over decades and with regularity in the average patient. Treatment of orthodontic problems covers years and is costly. Once the patient has lost his teeth, new dentures must, on the average, be constructed every three to five years to compensate for aging factors in the jaws. Without going into other phases of dental practice, it would seem evident that dental disease may not be insurable. Fire insurance carriers could not survive if all property was damaged or destroyed, then rebuilt, only to be destroyed and rebuilt over and over again. This is the nature of dental disease in light of today's knowledge. Could this, then, be less of a problem of insurance and more of a budget problem? Regardless of this situation, dentists must inevitably face the fact that as a greater and greater number of medical conditions are covered, dentists will become more and more objects of resentment unless measures are found to alleviate what has been termed the "impact of catastrophic dental bills on the family income."

■ *Discussion*

In Lancaster we have a nonprofit Medical-Dental Bureau formed by the Lancaster County Medical and Lancaster County Dental Societies where patients who are normal credit risks may borrow for medical, dental, and hospital services on an interest-free basis. When the Bureau was founded, the referred paper was discounted at 10 per cent and the referrer received 50 per cent at once and the balance on completion of services. Today, the discount rate is down to 8 per cent, with further reduction in the interest rate anticipated. Until such time as the practicability of prepaid insurance for dental afflictions is established, this type of plan could serve as a stopgap.

The calloused person could point to the 7 billion dollars the public spent for tobacco products, the 9 billion dollars spent for alcoholic beverages, and the 18 billion dollars spent on recreation and compare these figures with the 1.8 billion dollars spent for dental care, and justifiably ask "why the need?" It is not that simple. Dental costs represent a catastrophe to the individual, and one he heartily resents. The impact of a $150 dental procedure is magnified out of all proportion to, say, a bill of several hundred dollars on the family auto. Medical bills, by and large, are paid through places of employment as a fringe benefit or through personal policies carried by the individual. Dental bills, not covered in these categories, immediately cause resentment, for in the patient's mind dentistry is just another health service. Temporarily, a compromise of partial personal responsibility may be in order until more actuarial experience is gained. At the Lancaster Cleft Palate Clinic, the founder and director, Herbert Cooper, has repeatedly noted the satisfaction expressed by the partial or full paying patient, as opposed to the ungrateful acceptance shown by the state-subsidized patient.

Returning to the parallel mentioned earlier, that of the repeated destruction of all property by fire: Consider the child requiring multiple restorations of deciduous teeth from the ages of three

through ten, as well as occasional removal of these teeth under general anesthesia. In this period the permanent teeth will begin eruption and require treatment of the early pit and fissure cavities. As the child matures, multiple surface restorations become necessary. Compound this with the necessity of several years of orthodontic treatment. As the child becomes an adult, inlays and a one tooth bridge may enter the picture. It will be important to dentist, patient, and insurance carrier alike who will make the decisions relative to inlays versus large amalgam restorations and fixed versus removable bridges.

As the adult enters the middle decades of life, periodontal problems may arise which can be even longer in terms of length of time of treatment and greater in terms of cost than the earlier orthodontic treatment. From the partial denture period into the complete denture phase of life, recurring expenses, heavy in the patient's mind, reappear with a regularity familiar to all dentists. Impactions, fractures, tumors, and other dental problems have been omitted from this discussion deliberately, as the situation is already overwhelming. This in no wise means the situation is hopeless, however. From frustrations and struggles come knowledge and strength. This experience points up the need for study by the dental profession and the insurance carriers. Whether the dentist agrees with prepayment or not is of no importance, the day is very close when all medical ailments will be covered. Where, then, will dentists rank in the public's mind, since dental care constitutes such a big segment of the health services? One sixth of the health dollar is now being spent for dental disease. Dentists are in grave danger of becoming the most unpopular people among the practitioners of the healing arts.

■ *Comment*

Four recommendations can be suggested for the future, if only as interim action until something better can be developed:

1. Joint, continual, long range studies should be made by qualified, experienced actuarial and dental personnel from the national level, into all phases of prepayment insurance programs as they relate to the universal problem of dental disease.

2. Prepayment plans should be expanded as practicability becomes evident on the basis of the foregoing studies.

3. Individual participation in these plans should be encouraged where circumstances preclude group participation.

4. Uninsurable catastrophic dental health costs should be alleviated by interest-free financing plans, these plans to be developed and administered by nonprofit medical-dental bureaus at the local level in cooperation with component medical and dental societies.

Prepayment plans will have an ever increasing impact on the individual dental practice. Because of the universality of dental disease, universal insurance coverage of this entity is not in the foreseeable future.—548 *North Duke Street.*

*Chief of oral surgery, Lancaster General Hospital; oral surgeon to the Lancaster Cleft Palate Clinic.

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CASE REPORTS

Chondroma of the tongue: *report of case*

■ *Marvin D. Rosen, D.D.S., M.S., New York*

A wide variety of tumors are found in the mouth. In addition to those tumors specifically related to the dental organs, the mouth is also the site for the gamut of general epithelial and connective and supporting tissue tumors.

One of the least commonly encountered intraoral tumors is the chondroma. A chondroma may be expected to occur where cartilage is normally located, or where cartilage may have been located at some time in the organ's previous development. In the latter instance, cartilage rests may be assumed to exist, which upon sufficient and proper stimulation, begin to proliferate. The case reported in this article concerns a chondroma located in the tongue. As such, it is somewhat difficult to explain its presence. The possibility of the presence of ectopic rests and their subsequent proliferation must be considered. Bruce and McDonald[1] have reported two cases of chondroma of the tongue. In their cases, as in the case to be reported here, the pathogenesis of the tumor is not understood.

HISTORY—A 36 year old white man presented himself to the outpatient department of the 121 Evacuation Hospital (Korea) complaining of a "sore tongue." He stated that he had had a hard lump at the tip of his tongue as long as he could remember. The mass had been enlarging very slowly for more than 20 years. His tongue had never been painful or tender so he had not sought consultation or treatment previously. He had not experienced any difficulty eating or speaking until a few days before his appearance at the hospital when he had begun to bite his tongue accidentally at the site of the mass while eating or speaking. He then felt that he could no longer ignore the mass.

The past history and family history were essentially negative.

EXAMINATION—The patient's tongue was of normal contour and color except for an area just to the left of the midline near the tip. The tongue was visibly enlarged in an area along the left margin extending posteriorly from the midline approximately 2 cm. Dorsoventrally the enlargement was approximately 1.5 cm. in height. The mucosa overlying the mass was of normal color except for a small irregularly shaped area (0.5 cm. diameter) which was ecchymotic at its anterior margin on the dorsum and which was the site of the most recent trauma. On the ventral surface of the tongue, the mass was seen to protrude in a small circular nodule (3 mm. in diameter) visible as a bright yellow-white mass situated immediately beneath the very transparent overlying mucosa (Fig. 1, left).

On palpation a very hard, rocklike mass was easily palpable. It was clearly demarcated from all the surrounding lingual tissue. The

mass was movable, and the overlying mucosa moved freely over it (Fig. 1, right).

General oral hygiene was good, and the patient's teeth were in good repair. All other intraoral findings were noncontributory.

A general physical examination revealed a well-developed, well-nourished white man in no acute distress. All findings on general examination were noncontributory.

The results of a complete blood count and urinalysis were within normal limits and the findings from the serological tests for syphilis were negative.

TREATMENT AND COURSE—On July 26, 1955, an excisional biopsy of the mass was performed. The tongue was anesthetized by infiltration injection of procaine hydrochloride 2 per cent (with epinephrine in dilution of 1:50,000). The tongue was extended manually as much as was possible without distorting its contour. An incision was made along the left lateral border of the tongue from its apex to a point approximately 1 cm. posterior to the palpable posterior border of the mass. The mass was found to be well encapsulated and easily separable from the surrounding lingual tissue by blunt dissection. Despite the well-defined border exhibited by the mass, the dissection was carried out into the normal surrounding tissue sufficiently to remove the entire capsule. On removal, the mass was seen to be light yellow to white in color. It was very irregularly shaped and lobulated in many directions. In consistency it was very firm and slightly flexible. With a sharp knife the mass cut like cartilage.

Bleeding was controlled by pressure. Closure of the wound was accomplished by interrupted no. 000 black silk sutures. From the day of operation until the fifth postoperative day, the patient received procaine penicillin 600,000 units intramuscularly daily. Pain was controlled with 5 grains aspirin-phenacetin-caffeine compound with ½ grain codeine sulfate every four to six hours as needed. The patient was on a liquid diet for the first two postoperative days. After that his diet was adjusted as tolerated. On August 1 (the sixth day postoperatively), the sutures were removed. The wound healed uneventfully thereafter.

The pathologist's report was as follows: The gross specimen was a pale white to yellow grey, irregularly shaped mass 2 cm. by 1.5 cm. with strands of soft tissue attached. The consistency was hard and slightly flexible. The mass could be cut with a knife.

The microscopic examination of the section revealed the following: In a pale cartilagenous ground substance, chondrocytes of various sizes were seen. Some were surrounded by a calcific ring. Calcific material was marked in one area. Only a minimal amount of soft tissue was seen at the periphery, where within

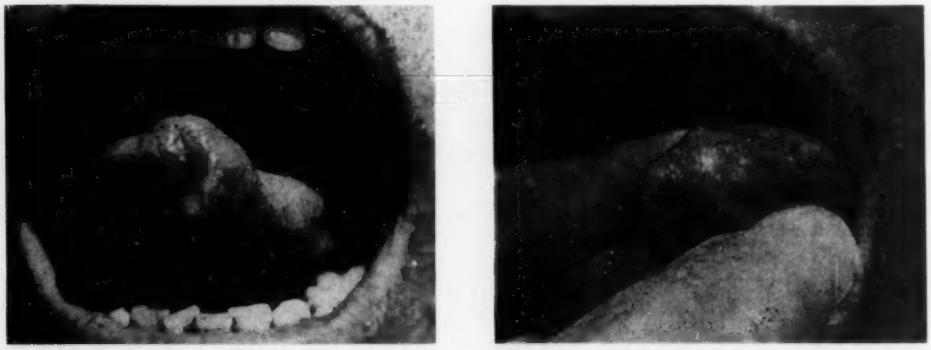

Fig. 1—Left: Preoperative contour of tongue. Note prominence on ventral surface where light colored mass can be seen through thin overlying mucosa. Right: Mass as delineated by palpation

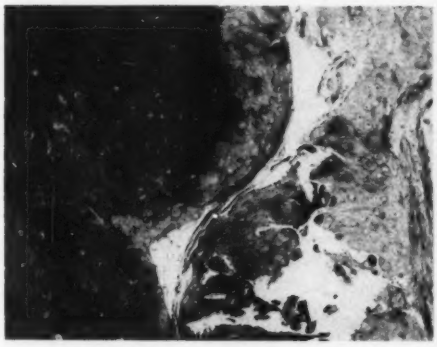

Fig. 2—High power photomicrograph of mass. Note layer of chondroid material at periphery of mass, indicating active proliferation

Fig. 3—View of tongue three and one half years postoperatively. (Illustration courtesy of Dr. Santo S. Cataudella)

loose connective tissue few cross-sections of vessels were present (Fig. 2).

The diagnosis was chondroma (ectopic).

RESULT—The patient was seen intermittently for the next two months. At that time, the wound was well healed and the tongue was of normal contour and consistency. The patient no longer experienced difficulty in eating or speaking. The patient was seen again in December 1958 (three and one half years postoperatively) by Capt. Santo S. Cataudella, post oral surgeon, Fort Lee, Va. He reported, "At this time the patient's entire oral cavity is within normal limits. The tongue and floor of the mouth show no masses on bimanual palpation. There is no lymphadenopathy. There is no sign of scarring on the tongue at the site where the lesion was excised" (Fig. 3).

DISCUSSION—The presence of ectopic rests as the basis of the pathogenesis of this tumor has already been mentioned. Another reason could be the presence of the multipotential cells of the undifferentiated mesenchyma that remain in the interstitial tissue of most organs. These cells, with the proper stimulation, can give rise to the gamut of connective and supporting tissue cells. The rarity of a mass of this sort makes an estimate of the clinical future of the patient after the mass is removed most important. The presence of this tumor as long as the patient could remember and its extremely slow enlargement, suggest benignity, as do the maturity and differentiation of the tumor cells themselves. Clinically, the tumor was well encapsulated and clearly separate from the normal tongue tissue. These characteristics are also suggestive of benignity. The subsequent postoperative history, as well, tends to bear out this conclusion.—*110 East Thirty-sixth Street.*

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■ The Humanities

By the neglect of the study of the humanities, which has been far too general, the profession of medicine loses a very precious quality.—*William Osler.*

Mucocele in a six year old child:
report of case

■ *William B. Linenberg,* D.D.S., M.S.D.; L. Edgar Frush,† D.D.S., and H. James Harpole,‡ D.D.S., Atlanta, Ga.*

A mucocele is a retention cyst apparently produced by a traumatic defect or severing of a salivary duct and the subsequent escape of saliva into the adjacent tissues.[1,2]

A review of the literature reveals that few mucoceles have been reported in persons in the first decade of life.[3,4] For that reason, a report is presented of a six year old Negro girl with a mucocele in the right side of the floor of the mouth which extended to the ventral surface of the tongue (Fig. 1).

REPORT OF CASE—On March 23, 1960 a well developed and well nourished six year old Negro girl was referred from the ear, nose and throat service of the Grady Memorial Hospital for diagnosis and treatment. The mother had brought the child to the hospital because the girl was having difficulty in phonation, deglutition and mastication. The mother had first noticed a swelling on the right side of the floor of the mouth two months previously. The swelling had increased slowly in size. The child had evidenced no pain and a history of trauma was denied.

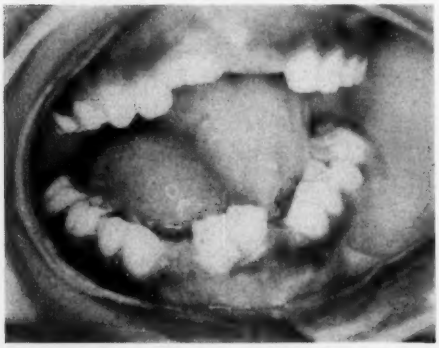

Fig. 1—Preoperative view of mucocele in the right side of the floor of the mouth

EXAMINATION—A visual examination of the child's face revealed no swelling or asymmetry in the right submandibular region. On palpation, a lymphadenopathy was apparent in the right cervical region. All the lymph nodes were nontender, freely movable and firm. Intraoral examination revealed a bluish-gray, cystic swelling about 4 by 3 by 2 cm. in the right side of the floor of the mouth extending to the ventral surface of the tongue. The swelling was soft, fluctuant, nontender, and not inflamed. When the tongue was raised, the mass rose high over the occlusal surfaces of the teeth on the right side of the mandible. The patient's temperature was not elevated and the remainder of the clinical examination was negative.

Roentgenographic examination of the region was negative.

The preoperative diagnosis was mucocele of the right floor of the mouth extending to the ventral surface of the tongue and the patient was admitted to the hospital.

The systemic examination was noncontributory. Chest roentgenograms were negative. On admission, blood studies revealed a white

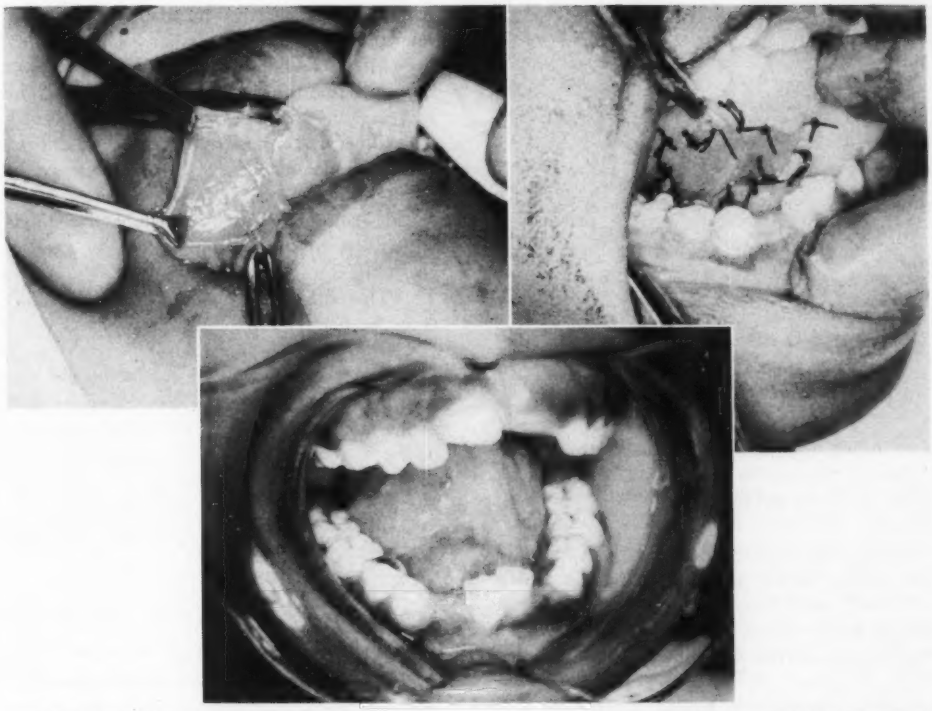

Fig. 2—Above left: Removal of superior wall of mucocele. Above right: Periphery of cyst lining sutured to surrounding mucous membrane. Below: Sutures removed

blood cell count of 7,350. The hematocrit was 34 mm. and the hemoglobin was 10.4 Gm. The urinalysis was essentially negative and the urine had a specific gravity of 1.012. The results of the serologic examination were negative.

TREATMENT—On March 28 the patient was premedicated intramuscularly with 100 mg. of hydroxyzine hydrochloride and 0.6 mg. of atropine. Under ether, nitrous oxide-oxygen anesthesia, an oral endotracheal intubation was performed. The oral cavity was disinfected with nitromersol tincture. The region surrounding the mouth was then draped with sterile towels and sheets. Two throat packs were introduced into the oral pharynx and a mouth prop was placed between the maxillary and mandibular teeth on the left side. A retraction suture of no. 00 black silk was placed through the tip of the tongue.

A 3 cm. incision, parallel to Wharton's duct, was made along the crest of the mucocele no more than 0.5 mm. in depth. The mucous membrane of the floor of the mouth was reflected from the superior portion of the mucocele in an attempt to remove the cyst in its entirety. However, a complete separation of the cyst from the mucous membrane was impossible. The cyst was perforated and it collapsed after approximately 10 cc. of yellowish, viscid, mucoid material was aspirated.

A marsupialization was then performed (Fig. 2, above left). The overlying mucous membrane and the superior wall of the mucocele were removed and the periphery of the

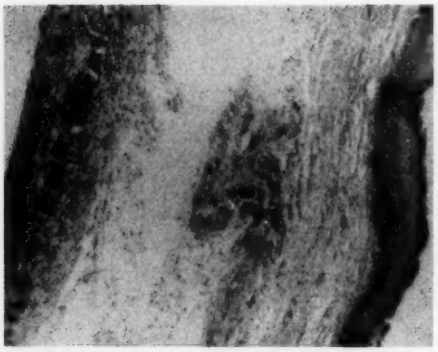

Fig. 3—Photomicrograph of specimen

cyst lining was sutured to the mucous membrane of the mouth with no. 000 black silk (Fig. 2, above right).

POSTOPERATIVE COURSE—Except for mild postsurgical edema and moderate pain which was easily controlled by acetylsalicylic acid, the postoperative course was uneventful. At the end of one week, the sutures were removed (Fig. 2, below). At the end of two weeks the region was completely healed.

PATHOLOGIC FINDINGS — Macroscopically, the specimen consisted of five pieces of soft tissue, one of which was a strip of thin, soft tissue measuring 3 by 0.2 by 0.2 cm. The remaining four pieces were smaller, irregularly-shaped fragments.

Microscopic examination of these sections showed a number of strips of oral mucosa. The covering epithelium was essentially normal. The subjacent connective tissue showed diffuse, chronic inflammation with the presence of mucin in the tissue. In one area, there was a thick, compressed zone of connective tissue which was interpreted as the "roof" of a mucocele (Fig. 3).

The diagnosis was mucocele (ranula) from the floor of the mouth.

SUMMARY—A six year old Negro girl was seen because of a mucocele located in the floor of the mouth on the right side which extended to the ventral surface of the tongue. Few instances have been reported in the literature involving a child in the first decade of life. Histologic examination of specimens confirmed the diagnosis of mucocele.

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‡Chief, department of oral surgery, Grady Memorial Hospital.

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■ STIMULANTS TO PROGRESS

Whether the race of men on earth mounteth a loftier tower by justice, or by crooked wiles, my mind is divided in distinguishing that clearly.—*Pindar* (522-443 B.C.).

Unusual complication after attempted removal of impacted mandibular third molar: *report of case*

■ *Raymond F. Huebsch,* D.D.S., and Howard S. Kramer,† D.D.S., U. S. Navy*

In August 1957 a 32 year old white male physician was referred to the oral surgery service of the U. S. Naval Hospital for definitive treatment after the attempted removal, about four weeks previously, of an impacted mandibular left third molar by a civilian dentist.

The tooth had been impacted in a mesiobuccoangular position (Fig. 1). In an attempt to remove it by sectioning with an osteotome and mallet, the tooth was traumatically displaced and the dentist was no longer able to visualize or palpate it in the surgical site. A periapical film taken at the time did not reveal the tooth in the operative site. The mucoperiosteum was approximated and closed, and no further attempt was made to localize or to remove the tooth at that time. Afterward the patient had persistent trismus, swelling and intermittent pain of the left side of the mandible. He had one episode of chills and temperature of 101°. He had been on systemic antibiotic therapy, and had felt essentially well for the previous week.

Physical examination revealed a well-developed young man with essentially negative findings except for the oral cavity. Oral examination revealed that the patient was unable to open his mouth to any great extent because of extensive swelling of the oral tissue in the mandibular left third molar region. The swelling extended superiorly along the ascending ramus, and medially involving the floor of the mouth. The patient's mandible deviated slightly to the right on opening, and the maximum opening was 10 to 15 mm. The oral wound was healed and showed no evidence of infection at that site. There was no lymphadenopathy but there was minimal swelling of the face.

Roentgenographic examination disclosed the misplaced tooth to be located medial to the mandible and lying almost at the inferior border of the angle (Fig. 2 and 3). Evidently it had been driven inferiorly through the medial cortical plate of the mandible. Laboratory findings were within normal limits except for a mild leukocytosis, and the patient was considered a good risk for general anesthesia.

The patient was started on a course of systemic antibiotic therapy with oxytetracycline 1 Gm. daily and hot saline mouth rinses, in an attempt to reduce the soft tissue swelling and muscle trismus. However, he was unable to open his mouth to any greater extent, and it was decided to utilize general anesthesia in order to get maximum relaxation and to approach the displaced tooth intraorally.

On September 6, the patient was prepared for surgery. He was induced with thiopental sodium intravenously and succinylcholine chloride administered for muscle relaxation. Intubation was by the oral route utilizing an

Figure 1

Figure 2

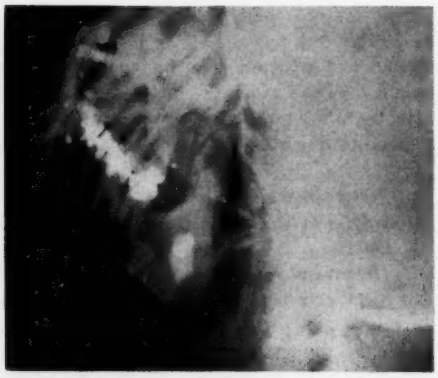

Figure 3

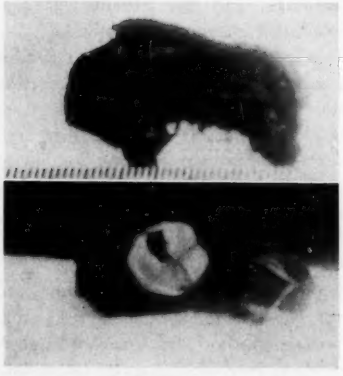

Figure 4

Figure 5

inflated cuff, and surgical anesthesia was maintained with thiopental sodium and nitrous oxide.

An incision was made through the mucoperiosteum extending from the second molar region to the ascending ramus posteriorly at the lingual aspect of the mandibular ridge. The incision was carried inferiorly by sharp dissection along the medial aspect of the mandible toward the inferior border. The impacted tooth was palpated, dissected free from the internal pterygoid muscle and removed. The tooth had been completely embedded and fibrosed in a dense mass of muscle (Fig. 4). A Penrose drain was placed and the wound was closed with interrupted catgut sutures. Pressure packs were applied, and the patient was sent to the recovery ward with orders for systemic antibiotics, sedation for pain and a soft diet.

Postoperatively the patient did well. He had moderate edema and trismus, but was generally comfortable. The Penrose drain was removed on the first postoperative day. By the fifth day after surgery the patient was progressing very well, and he felt a great deal better.

The patient had some postoperative anesthesia of the lingual nerve. Sensation returned gradually over a period of two months, and the patient now has complete sensation including the anterior tip of the tongue, which was the last region to return to normal (Fig. 5).

Fig. 1—Periapical view showing original location of tooth

Fig. 2—Preoperative occlusal view showing misplaced tooth

Fig. 3—Other views showing misplaced tooth

Fig. 4—Above: Specimen of internal pterygoid muscle with tooth entirely embedded. Below: Tooth dissected free of muscle

Fig. 5—Postoperative view

COMMENTS—Fractures of the mandible occur frequently when excessive force has been applied in an attempt to remove a firmly fixed impacted mandibular third molar in the region of the angle. In this instance the tooth was lying in a mesiobuccoangular position. In retrospect it would seem that an attempt to split the tooth with an osteotome should have been avoided because of the risk of forcing the tooth through the lingual plate of the mandible. The tooth could have been removed by removing adequate buccal bone and elevating the tooth in a buccal direction.

An extraoral approach to remove the displaced tooth probably would have been the method of choice in this instance. It would have been a more rapid and more direct means of approaching this tooth. The necessity of forcing the mouth open to such a degree in order to gain access and visibility, and the added trauma to the soft tissues, would have been avoided.

CONCLUSIONS—This case involves a rather rare complication resulting from the attempted removal of an impacted mandibular third molar by the division of the tooth with chisel and mallet. The operator should use caution when utilizing this technic and should be certain that the direction of his force is along a controlled region. This may be assured by using a bur to cut a deep groove in the crown of the tooth and by the direction of his blow toward the maximum bulk of the mandible. If the supporting bone is thin and the blow by the mallet is hard, the tooth may act as a projectile and may bury itself in soft tissue, thus making recovery extremely difficult, and fracture of the mandible possible.

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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Neurofibroma of the mandible: *report of case*

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The following case illustrates the occurrence of a solitary neurofibroma of the mandible.

A two and one half year old white boy was first seen at Letterman Army Hospital on December 13, 1955. He had been referred for definitive treatment of a tumor of the left side of the mandible. The child's parents had first noticed an asymmetry of the lower jaw on September 2, 1955. The patient had been taken to a service hospital, where clinical and roentgenographic examination disclosed an expansile, firm and nonpainful destructive lesion involving the body of the mandible on the left side. Expansion of the mandibular cortex was reported to extend from the region of the first deciduous molar to the region of the unerupted first permanent molar. The mass was stated to measure approximately 4 by 4 by 3 cm. with a predominance of swelling on the lingual aspect of the mandibular alveolar ridge on the left side. There had been no evidence of ulceration or sign of inflammation about the tumor. Several small cervical lymph nodes were reported to be palpable at the time of initial examination. A roentgenographic skeletal survey was reported as negative.

On September 28, 1955, a specimen of the lesion had been removed for biopsy. The report of histopathologic examination of the biopsy specimen provided a diagnosis of "fibroma of bone" (confirmed by the Armed Forces Institute of Pathology).

According to transfer records, on October 5, 1955, an initial attempt to remove the lesion of the left side of the body of the mandible had been undertaken through an intraoral approach. The description of the procedure stated that the mandibular left second deciduous molar was extracted and the lesion was approached through a window developed in the thin overlying mandibular cortex. The mass, including the first permanent molar tooth bud, was removed, although difficulty was encountered because of the adherent nature of the lesion. Approximately two weeks after surgery, normal healing was reported to be in progress at the operative site and residual mandibular asymmetry was minimal. Subsequent follow-up examination November 20 disclosed a recurrence of the mandibular tumor, dimensions of which were estimated to exceed those of the original lesion by approximately 50 per cent. The patient evidenced no weight loss or other constitutional disturbance associated with this recurrence and there was no history of trauma or inflammation related to this development.

The past personal and family histories failed to provide pertinent data.

EXAMINATION—When first seen at Letterman Army Hospital, December 13, the child appeared to be in no particular distress. His mother reported that, although he had developed a retardation in speech, he was able to take his normal diet without particular difficulty. Examination of the mandible revealed a hard, nontender, large and regular tumor firmly fixed to the left body of the mandible (Fig. 1). The swelling extended from the mental region to the left angle of the mandible and appeared to surround completely the body of the mandible. The floor of the mouth was

elevated on the left and the tongue was deviated toward the right. Intraoral examination revealed the previous operative site to be well healed and disclosed no sign of inflammation or ulceration. The tonsils were enlarged and several small cervical lymph nodes were palpable. General physical examination was essentially negative, except for the mandibular lesion.

Roentgenographic examination of the mandible and facial bones disclosed a 2 by 3 cm. radiolucent lesion involving the body of the mandible on the left side. The left second deciduous molar was missing. The intraosseous defect extended to the lower border of the mandible and had a somewhat irregular, poorly defined border. There was marked thinning of the cortical plates. Extension of the lesion appeared to project into the left ramus. Prominent soft tissue shadows were evident beneath the inferior border of the mandible. There was no evidence of calcification within the tissues beyond the contours of the left side of the mandible. A roentgenographic bone survey and routine chest roentgenogram were reported to be negative. Laboratory findings were all within normal limits.

TREATMENT AND COURSE—After admission and examination, the patient was presented to the tumor board of Letterman Army Hospital on December 20. All data pertaining to the case were reviewed. A short light course of radiation therapy was prescribed on the basis of the radiology consultant's belief that fibromas of bone may alter their course in a manner similar to ossifying fibroma or fibro-osteoma. The patient subsequently received a course of 750 roentgens in four divided doses, to the lesion of the body of the left side of the mandible.

After this course of treatment, the patient was scheduled for close follow-up evaluation and was discharged from the hospital on December 23. However, it was not until March 10, 1956, that the patient was returned and admitted for thorough reappraisal. Clinical and roentgenographic examinations at this time indicated an increase in the size of the lesion, with more positive evidence of expansion into the ramus of the mandible, and extension toward the symphysis (Fig. 1, right). The general status of the patient remained essentially unchanged. There was no secondary cervical lymphadenopathy or evidence of inflammation.

On March 13, the patient was again presented to the tumor board of Letterman Army Hospital. After a complete review of the findings, surgical removal of the mandibular lesion was recommended.

Fig. 1—Left: View December 13, 1955. Right: Roentgenographic view March 13, 1956, showing progressive destruction of bone, gnarled constriction of lower part of body of mandible and spread into ramus

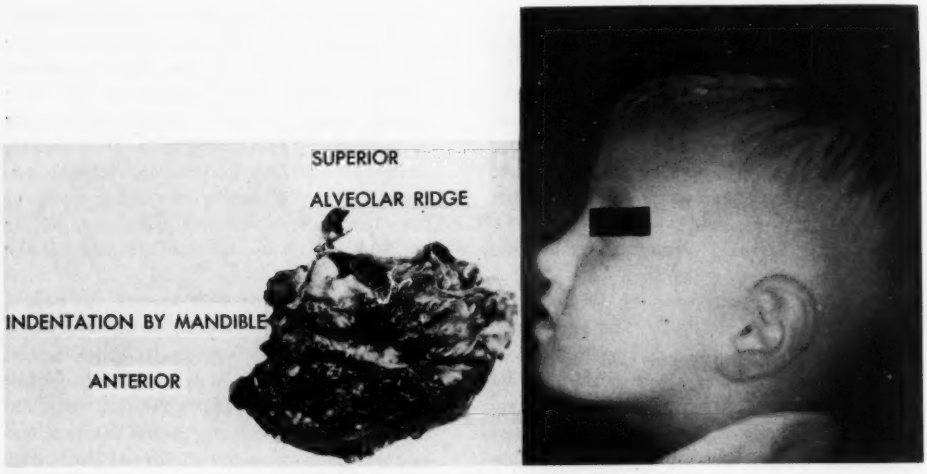

Fig. 2—Left: Gross specimen. Tumor had surrounded mandible completely. Note indentation of mandible in gross specimen. Right: Patient in June 1956, with no clinical evidence of swelling or asymmetry

OPERATION—On March 16, with the patient under endotracheal ether-oxygen anesthesia, excision of the mandibular tumor was carried out through a combination intraoral and extraoral approach. An incision approximately 8 cm. in length was made below the inferior border of the mandible, extending from the angle to the region of the symphysis. The subcutaneous tissues were retracted and the platysma muscle was incised. Branches of the facial nerve were identified and carefully retracted with the soft tissue flap. The left external maxillary artery and anterior facial vein were ligated and sectioned.

By sharp and blunt dissection, the soft tissues overlying the tumor were divided to expose the inferior surface of the well-defined mass. Dissection was carried superiorly on both the buccal and lingual aspects of the tumor. Dissection was also directed anteroposteriorly until normally contoured portions of the mandible were identified. The mouth was opened and an intraoral incision was carried from approximately midway on the anterior border of the ramus, along the sulcus, buccal to the distorted alveolar ridge anteriorly to the left deciduous cuspid. A like incision was made on the lingual aspect of the expanded alveolar ridge. The deciduous left cuspid and first molar were extracted. Dissection was next carried inferiorly both buccally and lingually through normal soft tissue to meet the extraoral dissection. The presenting tumor was thus completely freed from surrounding tissues by communication of the intraoral and extraoral dissections.

Through the extraoral incision, the mass was incised anteroposteriorly to the lateral cortex of the mandible at its lower border. By using a sharp flat No. 4 Molt curet, it was determined that the mass could be dissected from the dense cortical bone of the base of the body of the mandible without difficulty. It was then "unwrapped," so to speak, by this method of sharp dissection from the lingual, buccal and alveolar aspects of the bone. Extensions into the body and ramus, principally on the buccal and superior surfaces, were widely uncovered by excision of cortical bone, and the bulk of the tumor was removed with the gross specimen. The inferior alveolar nerve, which was surrounded by tumor, was sectioned at the mandibular foramen and removed with this principal mass (Fig. 2, left).

Pseudopodia of the tumor found in deeper invaginations at the inferior border, in the symphysis and high in the ramus were enucleated cleanly after the main tumor mass was out of the way. The remaining osseous structure of the body of the left side of the mandible was diminutive and showed gross distortion in shape and contour, due to the strangling effect of the tumor surrounding it. Neoplastic tissue appeared to involve the tooth buds of the left permanent cuspid, the first bicuspid and second permanent molar. These islands of tumor tissue, together with the tooth buds, were removed. The bone invasion did not have the gross characteristics of a malignant tumor. Inspection of the operative site indicated that the tumor had been completely removed. A submandibular lymph node that was adjacent to the operative site was removed for histopathologic examination.

The intraoral wound was closed with no. 0000 chromic catgut followed by closures of the extraoral wound with no. 0000 plain catgut. The skin incision was closed with interrupted no. 00000 Dermalon sutures. A semipressure dressing was applied and the patient was returned to the ward in good condition. All tissues removed at surgery were submitted for histopathologic examination.

POSTOPERATIVE COURSE—The patient's postoperative course was uneventful except for a short febrile episode associated with mild symptoms of an upper respiratory infection. Rapid and uncomplicated healing occurred at the operative site. The patient was discharged from the hospital on March 31, 1956, with the request to return in two months for postoperative observation. He was readmitted in June 1956, when healing both clinically and roentgenographically appeared to be normal. Symmetry of the face was normal (Fig. 2, right). The bone pattern was of good density with but one small residual area of radiolucency (Fig. 3, left). This area was concluded to be the mental foramen or an area of cicatricial tissue. Although the body itself was small compared to the opposite uninvolved side, it had returned to relatively normal contour and no longer had the extreme gnarled topography that was evident when the tumor was constricting it.

Since the child's father was leaving the military service, he was not seen by our service again. He was subsequently examined in civilian institutions in February 1957 and May 1958. Reports to us of these examinations indicated that there has been no recurrence in this two year follow-up period. It will be exceedingly interesting to observe developmental

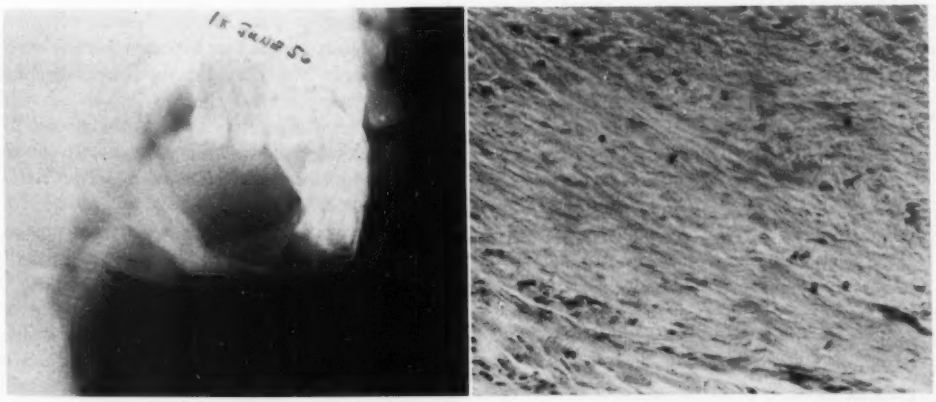

Fig. 3—Left: Roentgenographic view June 18, 1956, showing complete healing of bone with only one residual area of radiolucency, which was concluded to be the mental foramen or an area of residual cicatricial tissue. Right: Histopathologic specimen

deficiencies which will probably occur as a result of this large tumor and its surgical treatment. Further follow-up reports are hoped for.

PATHOLOGY REPORT—The pathological diagnosis of the specimen was neurofibroma in the region of the body and ramus of the mandible on the left side. The report further stated that tumor tissue could be identified infiltrating small bands of skeletal muscle. On one section, the inferior alveolar nerve showed an apparent marked increase of fibrous tissue and an indefinite margin which appeared to blend with the tumor. The margin between the neoplastic growth and the surrounding connective tissue was extremely vague. Some areas within the histologic material showed some pleomorphism and crowding of nuclei, but the pattern was not considered sufficiently atypical to indicate the presence of malignant change (Fig. 3, right). The lymph node submitted with the surgical specimen showed no evidence of involvement by the tumor (confirmed by Armed Forces Institute of Pathology).

DISCUSSION—The occurrence of a solitary neurofibroma involving the mandible is very rare.[1] In 1944, Rushton[2] reported the occurrence of a solitary neurofibroma involving the mandible and right side of the face of an 18 year old patient. This patient's history indicated a mandibular asymmetry had been discovered at birth and subsequently had gradually increased to produce a marked facial deformity. The tumor extended to involve the facial muscles of the right side of the face. Goldman[3] also reported a solitary neurogenic fibroma of the mandible, as did Zilkens.[4] The mandibular deformity of the 17 year old patient, whose case was reported by Zilkens, had been present approximately 11 years and had caused progressive facial disfigurement. The infrequency of solitary neurofibromas involving bone has been noted by Lichtenstein[5] with the remark that solitary neurofibromas within the bone are exceedingly rare and that little information regarding them is to be found in the literature.

Bone involvement occurring in relation to multiple neurofibromatosis has been reported more frequently. A careful study for evidence of neurofibromatosis (von Recklinghausen's neurofibromatosis) was therefore carried out in the two and a half year old patient described in this report. The skin pigmentation which is one of the diagnostic features of this entity appears at birth or in early infancy and is said frequently to precede formation of the typical cutaneous tumors. These pigmented areas are not grossly different from ordinary benign pigmented melanotic nevi.[6] Our patient did not have any well-defined pigmented cafe-au-lait macular patches on his body and evidenced no other symptoms of neurofibromatosis.

The congenital and hereditary-familial characteristics of von Recklinghausen's disease have been reported extensively in the literature. Borberg[7] studied 84 cases and found an inheritance pattern in 41.7 per cent of the patients. Frank[8] has also traced the occurrence of a case of von Recklinghausen's disease back five generations. Borkenhagen and Vazirani[9] reported a case in which a 17 year old girl had involvement of the mandible by a neurofibroma, without associated pigmented skin patches or cutaneous tumors. She was one of five siblings. A sister developed diffuse neurofibromatosis and subsequently neurofibrosarcoma with fatal metastases, while the mother had typical cutaneous forms of multiple neurofibromatosis, with onset of the disease first noted at about her twentieth year.

There was no familial history of neurofibromatosis in the case reported here.

Gould[10] was apparently one of the first to observe osseous changes associated with neurofibromatosis. He reported the occurrence of a decalcification and osteoporosis of the pelvic bones in association with diffuse neurofibromatosis.

Brooks and Lehman[11] reported seven cases of von Recklinghausen's neurofibromatosis with bone changes, which they considered to be characteristic of the entity. They noted a frequency of cysticlike changes in the skull characterized by thinning of the cranial vault as well as aplasia and atrophy of the mandible, maxilla and zygoma. They also ascribed the formation of the cystic lesions to actual invasion by neuro-

fibromas so that the resulting tumor was embedded within the bone substance or projected from the surface of the bone. The osteogenic periosteum covering such tumors, they found, may produce a shell of bone which results in the appearance of a cysticlike structure on roentgenographic examination of the involved area.

Uhlmann and Grossman[6] reported the occurrence of a cysticlike lesion in the right body and ramus of the mandible of a six year old patient exhibiting von Recklinghausen's neurofibromatosis. Roentgenographic survey in this instance revealed no other osseous lesions. A similar lesion of the mandible in a five year old white girl was reported by Martin and Graves.[12] The lesion subsequently developed sarcomatous change and fatal termination. Numerous other instances of malignant change occurring in instances of von Recklinghausen's disease, either spontaneously or after trauma associated with surgery, have been reported.[13-15] Hosoi[16] reported the occurrence of malignant change in 12 per cent of a series of 65 case reports. However, Davis and coauthors,[17] reporting data on 175 cases of neurofibromatosis in a study of neurofibromatosis involving the head and neck, indicated that surgical interference did not increase the incidence of malignant change in tumors occurring in soft tissues.

SUMMARY—An additional case of solitary neurofibroma of the mandible in a two and a half year old boy is reported. The sparse literature on this particular tumor is reviewed and Lichtenstein's remark that "solitary neurofibromas within bone are exceedingly rare with little information regarding them to be found in the literature" is heartily indorsed. This solitary tumor is not to be confused with bone involvement which occurs in multiple neurofibromatosis (von Recklinghausen's disease).

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■ Discoveries

The difference between what we find and what we think we ought to find often results in great discoveries.—*W. Albert Noyes, Jr.*

■ PERIODONTAL THERAPY. By Henry M. Goldman, D.M.D.; Saul Schluger, D.D.S.; Lewis Fox, D.D.S., and D. Walter Cohen, D.D.S. Second edition, 656 pages with 225 illustrations and 117 plates. $18.75. St. Louis, C. V. Mosby Co., 1960.

The revised and enlarged edition of this highly successful text represents the most modern viewpoints of four distinguished periodontists. An outstanding feature of the book is the large number of photographs and drawings which total approximately 1,100 because of the many plates that contain several illustrations. Step-by-step procedures in therapy are illustrated in clear detail by a series of high quality drawings and photographs. The authors are to be congratulated on these features. The 117 plates which appear at the end of many of the chapters are an excellent review of technics which the authors wish to stress. Each plate contains five or six illustrations lucidly showing a technic, and an explanatory legend appears on the opposing page.

Dentists invariably meet periodontal problems daily and they will eagerly study and quickly put into practice many of the technics presented. Emphasis is placed on a well-organized treatment plan which will provide the patient with a fine physiologic gingival condition which will aid greatly in maintaining periodontal health. This is secured by the judicial application of curettage, gingivectomy, gingivoplasty, osteoplasty and ostectomy in correct modifications for pocket elimination. Surgical procedures involving the infrabony pocket, bifurcation involvements and alteration in selected cases of the mucogingival junction and vestibular fornix are well presented. Many other special problems are made "easy," including the periodontal abscess, necrotizing ulcerative gingivitis and bony craters. There are other interesting chapters on occlusal adjustment, temporary splinting, minor orthodontics and oral habits and neuroses.

The reviewer is very favorably impressed by this book, although there are errors in printing in about a dozen instances where incorrect reference is made to illustrations.—*Zar A. Reader.*

■ DRUGS OF CHOICE 1960-1961. Edited by Walter Modell. 958 pages. Index. $13.50. St. Louis, C. V. Mosby Co., 1960.

This is the second in a series of manuals of drug therapy which was begun in 1958 with *Drugs of Choice 1958-1960.* It consists of 42 chapters by 47 authors. Excellent editing must be credited for its remarkably uniform style. The typography and paper are good. The editor apparently plans further revisions.

The book is offered as "a practical guide to the selection of the best drug for a particular therapeutic problem." In addition to qualifying as a guide, it offers very interesting occasional reading for those who will turn to it in their spare moments.

The range of drug therapy is fairly well covered, but there is no chapter on drugs for dentistry. Most dental readers will wish that more information were given about local anesthetics, hemostatics, and the systemic use of antibiotics. The chapters on suppression of appetite, nutritional factors, local antiseptics, stimulants, analgesics, sedatives and tranquilizers are especially good.

The tone of the writing is conservative, and all but a few of the drugs which are described are clearly useful. Trade names appear in the text along with generic names, but the trade names are capitalized, and there is little chance for confusion.

The 1960-1961 edition represents substantial revision. It contains eight new chapters, and three of the original chapters have been rewritten by new authors. It is a worthwhile contribution to the medical literature.—*Donald A. Wallace.*

■ PHYSICIANS FOR A GROWING AMERICA—REPORT OF THE SURGEON GENERAL'S CONSULTANT GROUP ON MEDICAL EDUCATION. By the Public Health Service, U. S. Department of Health, Education, and Welfare. 95 pages with 27 tables and 17 charts. 60 cents. Washington, D. C., U. S. Government Printing Office, 1959.

A rapidly expanding economy is frequently accompanied by economic and social changes that disturb the existing relationship between supply and demand for goods and services. In recent years, this disturbance has been particularly acute in the area of medicine. Late in 1958, the Surgeon General established a Consultant Group on Medical Education to investigate the growing gap between supply and demand for medical services. This brochure is a report of the group.

The report is extremely well organized. The first chapter presents an excellent description of the supply and demand picture for medical services. In the following three chapters each of the three major factors that affect the supply side of the problem is discussed in detail. These factors are students, schools and financing of schools. Each chapter contains a summary enumerating the key points discussed. The over-all summary of the study and the group's specific recommendations are presented in the last chapter. The arguments contained in the text are well supported and illustrated by tables and charts.

Although the Consultant Group was specifically commissioned to study the needs in the field of medical education, it recognizes the fact that effective policies in this area require joint consideration with the needs of the dental profession. Accordingly, a summary statement of the problems of dental education has been included in the report in appendix A.

This report touches on an area of health services that should be of vital concern to both the members of the various health professions and the general lay public. The report is extremely thought-provoking and should provide a solid basing point for many formal and informal discussions in the future. For those who are particularly interested in dentistry, this brochure, read in conjunction with the many reports published by the various agencies of the American Dental Association, should provide a well rounded frame of reference regarding the contemporary supply problems of dental services.—*George Y. Ogawa.*

■ AN ATLAS OF DENTAL AND ORAL RADIOLOGY. By Sydney Blackman. 371 pages with index. $15. Baltimore, The Williams & Wilkins Co., 1960.

As director of the department of radiology at the London School of Dental Surgery, Dr. Blackman has compiled over 1,000 roentgenograms from his huge collection taken over the past 28 years and had them excellently reproduced in his book. Each photographic reproduction is adequately explained.

The text is divided into three parts. Part I covers normal roentgenographic appearances as well as developmental aberrations, anomalies, calcified odontomas, and salivary calculi. Part II treats the inflammatory and traumatic lesions of teeth and jaws, including roentgenographic interpretation of caries, periodontal diseases, osteomyelitis, the maxillary sinus, and fractures of the teeth and facial bones. Part III covers cysts of the teeth, bones and soft tissues associated with the oral cavity as well as tumors. This part ends with a brief section on systemic diseases. This last section very well could have been covered more completely since only osteitis fibrosa cystica, fibrous dysplasia, osteopetrosis, Paget's disease, cleidocranial dysostosis and eosinophilic granuloma are illustrated. I am particularly impressed with the section on osteomyelitis.

This atlas should serve as an informative text and reference book for the dental profession.—*Wilbur J. Dickman.*

■ SYNOPSIS OF PATHOLOGY. By W. A. D. Anderson. 876 pages with references, index, and 118 illustrations. $9.25. C. V. Mosby Co., St. Louis, 1960.

Dr. Anderson has revised his text to bring it up to date and has preserved it successfully as a condensed presentation of general pathology. The 25 chapters are clearly written and well illustrated. In this fifth edition, bibliographic references have been reduced in order to maintain the volume at its previous size since many subjects have been enlarged and discussions of newly recognized diseases or syndromes have been added. These include the carcinoid syndrome, Dubin-Sprinz disease, Connis syndrome, and so forth. New information is included in regard to neoplasms, histoplasmosis, nephrosis, renal necrosis, potassium deficiency, uremic pneumonitis, hyaline diseases, viral hepatitis, cirrhosis of the liver, fibrous dysplasia, vascular diseases, collagen diseases, the endocrine glands, hypersensitivity, and other conditions.

This *Synopsis of Pathology* is recommended not only as a student's text but also as a valuable reference text and review of the basic and current aspects of diseases for all of us who treat patients.—*Wilbur J. Dickman.*

■ BONE TISSUE FORMATION: A MORPHOLOGICAL AND HISTOCHEMICAL STUDY. Harald Löe. 119 pages with 6 black and white and 29 colored illustrations. Acta Odontologica Scandinavica, Vol. 17, Supplementum 27, 1959.

Undecalcified as well as decalcified bone from dogs was subjected to various morphologic and histochemical technics in an attempt to explain the process of bone tissue formation. Pieces of bone were fixed in neutral Formalin, in Zenker's fluid or by freeze-drying. Some of the Formalin-fixed material was decalcified, embedded in paraffin and sectioned according to the usual procedure. The remaining undecalcified bones were embedded in methacrylate and cut serially at 6 microns on a metallurgic microtome. Both decalcified and undecalcified sections were tested for general morphology, fibers, carbohydrate containing compounds, inorganic mineral salts, alkaline phosphatase and metachromasia by a variety of staining and microscopic procedures.

The author suggests from the observations of the foregoing materials that three stages of development may be discerned in the process of osteogenesis. The first stage is the formation of mature collagen fibers and ground substance. During this stage the osteoblasts play a decisive role in the formation of the precollagenous fiber, which, in the presence of chondroitin sulfate and alkaline phosphatase, is converted to mature collagen. The exact nature of the interplay between these substances is not known. However, it is believed that the conversion of the precollagen fiber into mature collagen is brought about by the interaction between the precollagen fibers and the chondroitin sulfate (the cementing substance) and that somehow the alkaline phosphatase enhances this union. Besides the acid polysaccharide mentioned earlier, neutral polysaccharide-protein complex, or the ground substance, plays an important, albeit unknown, role.

In the second stage, there is a structural change of the collagen fibers into nonfibrous units. This stage is followed by the final stage in which there is a polymerization of the ground substance, the reconstitution of collagen fibers and initial mineralization of the matrix. The interaction between the osteoid and minerals is brought about by an increase in the electronegative charge of the area. Once mineralization is initiated, a relatively high degree of calcification is reached within a short period of time provided the mineral supply is normal.

One is impressed with the skillful manner in which this complex subject is considered and presented. There can be no doubt as to the value of this work in elucidating many of the unanswered questions in osteogenesis. The monograph is highly recommended to all those interested in the biology of bone.—*George M. Yamane.*

■ Fibrous Dysplasia of the Mandible in Children. Michael L. Lewin. Plast. & Reconstr. Surg. 25:161 Feb. 1960.

Three instances of fibrous dysplasia of the mandible in children are presented. They were selected to demonstrate the diversity in the clinical picture of this disease. Because fibrous dysplastic lesions vary in their distribution and clinical behavior, the disease has been known under a variety of names, many of which were considered to represent unrelated clinical entities. Changing concepts of the nature of these fibro-osseodysplastic lesions since the beginning of the last century have been described.

Complete excision of a single lesion of fibrous dysplasia practically assures cure. Many such lesions were successfully treated in this way under the diagnosis of osteofibroma. However, complete excision requires a segmental resection and often a hemimandibulectomy. Such a radical procedure is not justified for a lesion which is benign, does not metastasize, and is, in most instances, self-limiting.

Not all cases of fibrous dysplasia require surgical treatment. The accepted practice is to perform conservative operations, but only when the degree of the deformity warrants them. Conservative surgical treatment consists in "trimming" or partial removal of the tumor, reducing the mandible to more normal proportions. Recurrences, however, have been reported, and secondary, more extensive operations have been required. Obviously, incomplete removal of a tumor at any age will be of only temporary benefit when the tumor is actively growing. However, there is no assurance that such tumors cease growing after puberty.

When a fibrous dysplasia tumor shows a rapid, unrestricted growth, it may be suspected that it is undergoing malignant degeneration. The development of osteosarcoma in a fibrous dysplastic lesion in the long bones is described but such instances are extremely rare. Such an explanation need not be resorted to in order to account for the exhilarated rate of growth; it is still compatible with the course of fibrous dysplasia. However, therapeutic measures must be adapted to the clinical behavior of the tumor in a particular instance. Treatment cannot always be curative but may have to aim toward the best possible rehabilitation of the young patient.—*Myron Kaufman.*

■ Methohexital Sodium, a New Ultra-Short Acting Barbiturate. C. Taylor and B. K. Stoelting. Anesthesiology 21:29 June 1960.

Methohexital sodium (Brevitol), a new ultra-short-acting oxygen barbiturate, has been used as an intravenous anesthetic agent in 3,340 patients. It was given by intermittent administration of a 1 per cent solution or by the continuous administration of a 0.1 or 0.2 per cent solution. The major disadvantage of this drug is the production of muscular twitching and pain, which occurs frequently along the vein after injection of the solution. In none of these patients did thrombophlebitis develop during the postoperative period. Respiratory depression was more severe than with thiamylal sodium or thiopental sodium at a similar level of narcosis. Assisted or controlled ventilation is essential. Laryngospasm, hiccups, and coughing occurred infrequently.

Methohexital sodium has a greater potency and a shorter duration of action than other ultra-short-acting barbiturates. These factors allow better control of the level of anesthesia and a more rapid awakening after termination of anesthesia.—*Irwin A. Small.*

■ MANDIBULAR PROGNATHISM CORRECTED BY OVERLAPPING OPEN VERTICAL OSTEOTOMIES OF THE RAMI. Marsh Robinson, M.D., D.D.S. Am. J. Surg. 98:894 Dec. 1959.

Seventy-one surgical procedures for the correction of mandibular prognathism by open vertical overlapping osteotomies of the ascending rami are reported. All results have been good and no serious complications have occurred.

A nasal saw is used and the subcondylar osteotomy is made vertically from the deepest portion of the notch to 0.1 cm. above the angle on the posterior border. After division, slight pressure on the chin starts the ramus in a posterior direction. The condylar fragment is kept lateral. The wound is temporarily covered and a similar procedure is carried out on the opposite side. Examination is made to see that there is good contact of bone and that the proximal fragment is lateral to the distal fragment before closing the skin. All patients had their jaws wired together for seven weeks with one exception; in this instance the intermaxillary fixation was removed at five weeks.—*Myron Kaufman.*

■ UNILATERAL HYPERTROPHY OF THE MANDIBULAR CONDYLE. Irving Weissman and Edmund Collins. Radiology. 74:939 June 1960.

Condylar hypertrophy is a rare entity of unknown etiology which causes facial deformity and malocclusion. It may be unilateral or bilateral. The roentgenologic features are characteristic and account for the symptoms. The condition is progressive, becoming manifest in early childhood. In unilateral cases, the enlargement of the condyle, associated with elongation of the ascending ramus of the mandible, causes a lowering of the angle of the jaw and a shift of the symphysis to the unaffected side, giving the impression of a tumor growing on the normal side. Pain is not an outstanding symptom and may be absent until the disease has progressed to the stage of well marked deformity.

The cause of this condition is obscure. The disease may be comparable to the single cartilage-covered exostoses of long bones. Both occur at sites where precartilaginous tissue persists through a greater part of life. The entity has been reported as osteoma or exostosis of the condyle. A case report is presented. The treatment of this bone disturbance was condylectomy. The final diagnosis of a true hyperplasia of the mandibular condyle can be made only after histologic study of the surgical specimen to rule out other simulating causes such as Paget's disease, fibrous dysplasia, osteoid osteoma, chondroma, giant cell tumor, and osteogenic sarcoma.—*Irwin A. Small.*

■ CARCINOMA OF THE TONGUE: ITS BEHAVIOR AND MANAGEMENT. J. E. Hamilton, Wreno M. Hall and P. J. Harbrecht. Surgery 48:385 August 1960.

Although this accessible cancer gives fair warning when still over 80 per cent curable, one third of the patients that reach the Louisville Veterans Administration Hospital have a condition advanced beyond salvage. The patient is not alone to blame. Too often the first doctor consulted, unfamiliar with this field and loath to mutilate the patient, has ordered radiation to the tongue and has ignored neck nodes. Despite humane intentions he may well have denied the victim his chance for cure. The results of treatment to 39 patients with cancer of the tongue were evaluated.

The inverse relation of cancer size to curability in this series is striking. In aid of the nine arrests, the primary lesion measured 2.5 cms. or less despite the fact that in four of these the cervical nodes were positive.

The literature reveals that the salvage of patients whose cervical nodes are still only microscopically positive is over twice as great as it is for those with clinically obvious metastasis, which coincides with the author's own findings. This is especially important when it is recalled that cervical nodes, clinically negative, will prove histologically positive 17 per cent to 60 per cent of the time on the homo-

lateral side and 10 per cent to 28 per cent on the contralateral side. This calls for homolateral neck dissection in all instances and an increase in consideration of bilateral dissection. Results of and indications for resection as well as radiation therapy are presented. Five separate intraoral cancers in four patients of this series are described. The over-all salvage (2½ to 13 years) in this group of 39 patients, including nondeterminate and incurable cases, was 23 per cent but for curable cases was 41 per cent. The arrests primarily by operation were 50 per cent, by radiation, 27 per cent.—*Myron Kaufman.*

■ Cleft Palate-Type Speech in the Absence of Cleft Palate. P. Randall, F. P. Bakes and C. Kennedy. Plast. & Reconstr. Surg. 25:484 May 1960.

Cleft palate-type speech in the absence of cleft palate, tumor or trauma, is usually owing to one of three causes: (1) A congenitally short palate; (2) paralysis of the levator veli palatini muscles, or (3) a congenital deformity of the nasopharynx which renders a soft palate inadequate even though it is normal in structure.

When neurologic deficiencies are present, a definite diagnosis is desirable to determine whether the condition is stable or whether it is likely to progress or regress. A difficult decision must be made by the surgeon when there is weakness or paralysis of adjacent structures or when there is an appreciable degree of mental retardation. Congenital deformities in the nasopharynx causing cleft palate-type speech are usually best detected by soft tissue roentgenographic examination.

A series of nine cases is presented with the results of corrective surgery achieving improvement in all instances except one, a patient who died of a cardiac arrest. Hypernasality and articulatory errors have been constantly diminished or abolished. The effect of even a little improvement on the personalities of these discouraged and misunderstood patients has been dramatic. There have been no complications in the form of excessive hyponasality, difficulty in handling nasal secretions or problems with middle ear infections. The inferiorly based posterior pharyngeal flap was used in the majority of instances. The following reasons to support its use are presented: (1) It is a simple procedure and does not necessitate splitting the palate; (2) it directs the air stream into the mouth more readily than the superiorly based pharyngeal flap, and (3) it probably contributes to velopharyngeal closure by allowing the movement of the lateral pharyngeal walls toward the midline to be more effective in achieving closure.—*Myron Kaufman.*

■ The Use of Varidase During Radiation Therapy of Head and Neck Tumors. F. Gearing, P. Powers and G. Cooper, Jr. Radiology 75:121 July 1960.

The treatment of head and neck tumors by radiation is often complicated by a severe local inflammatory reaction. Swelling, induration, skin erythema, desquamation of oral mucosa, and purulent oral secretions, are seen frequently. Lymphatic and venous stases are prominent features. The authors have found streptokinase-streptodornase Varidase of use in modifying the inflammatory changes.

In selecting patients for treatment with Varidase, only those with a complete clinical picture, consisting of skin erythema, mucositis, lymphatic stasis, and soft tissue swelling, were considered. Varidase Buccal, one tablet, four times daily, was administered for from four to ten days. The only drug idiosyncrasy observed was increased soreness of the mouth of one patient. Varidase was used in conjunction with general hygienic measures and specific therapeutic agents. Antibiotics were given when indicated. Results were promising and maximum benefit usually occurred within 72 hours after beginning the administration of Varidase. —*Myron Kaufman.*

Announcements

■ Oral Surgeons Elect New Officers

Frank H. O'Halloran, Evansville, Ind., is the new president of the American Society of Oral Surgeons. Other officers elected at the annual meeting in Phoenix, Ariz., in October are: president-elect, Lyall O. Bishop, Walnut Creek, Calif.; vice-president, Edward C. Thompson, Urbana, Ill.; secretary-treasurer, Leroy W. Peterson, Clayton, Mo.; members of the executive council, Daniel F. Lynch, Washington, D. C.; John S. McQuade, Ventnor City, N. J.; Irwin T. Hyatt, Atlanta, Ga.; Robert B. Shira, Washington, D. C., and Fred A. Henny, Detroit, immediate past president.

The society's sixth honorary membership was awarded to Hamilton B. G. Robinson, dean, School of Dentistry, University of Kansas City, Kansas City, Mo., for his contributions to the advancement of oral surgery.

The society's forty-third annual meeting will be held aboard the S. S. Bergensfjord on a cruise to Bermuda October 7-13. Preliminary events and examination of candidates will be held in New York prior to the cruise.

■ Elmer B. Vliet Becomes Trustee of Educational Foundation

Mr. Elmer B. Vliet, chairman of the board of Abbott Laboratories, Inc., has been appointed a trustee of the Educational Foundation of the American Society of Oral Surgeons. Mr. Vliet joined the staff of Abbott Laboratories in 1919 and served successively as research chemist, manager of Control Laboratories, and vice-president and scientific administrator. He is active in the American Pharmaceutical Association and the Pharmaceutical Manufacturers Association and is widely known for his civic and charitable activities.

■ University of Washington's Oral Surgery Program

The University of Washington School of Dentistry, in conjunction with the graduate school of the university and the facilities of King County Hospital and the University of Washington Hospital, is presently offering three years of graduate education leading to a Master's Degree in oral surgery.

The nature and scope of this program qualifies the trainee for certification by the American Board of Oral Surgery. The second and third years are spent in the King County Hospital residency.

There is no University of Washington stipend for the academic year but the oral surgery department will assist wherever possible in obtaining a U. S. Public Health Service grant to carry out the graduate student research. The junior resident's salary is $150 a month plus board, room and laundry, and the senior resident receives the same benefits with $200 a month.

A graduate school bulletin and further information can be obtained by writing to John D. Gehrig, associate officer, School of Dentistry, University of Washington, Seattle 5, Wash.

■ Armed Forces Institute Lists Oral Pathology Course

The Armed Forces Institute of Pathology will present its annual course, "Pathology of the Oral Regions," April 10-14 in Washington, D. C. The course will emphasize pathology of the oral mucosa and jaws as well as oral manifestations of systemic disease. There are no fees for the program.

Quotas have been established for both civilian and military personnel. Members of the federal services should apply through their respective services. Civilians interested in enrolling in the course can apply to the director, Armed Forces Institute of Pathology, Washington 25, D. C.

■ Research, Teaching Traineeships at University of Pennsylvania

Research and teaching traineeships in the basic sciences, in periodontology and in the comprehensive treatment and rehabilitation of the cleft palate patient are available at the School of Dentistry, University of Pennsylvania. These may lead to M.S. or Ph.D. degrees.

The traineeship in periodontology is a two-year program devoted to basic science studies, clinical practice and research. It is intended primarily for those individuals who wish to enter teaching and research in periodontology. Inquiries should be sent to the dean of the Graduate School of Medicine, 237 Medical Laboratories, University of Pennsylvania, Philadelphia 4.

The traineeship in the comprehensive treatment and rehabilitation of the cleft palate patient is clinically oriented; however, opportunities for course work in fields related to cleft palate therapy are available. Inquiries should be sent to the chairman, Committee on Traineeships and Fellowships, University of Pennsylvania, School of Dentistry, 4001 Spruce St., Philadelphia 4.

All traineeships are supported by the U. S. Public Health Service. Annual stipends vary from $4,500 and up depending on the qualifications and needs of the successful candidates.

■ 1962 Albert Joachim Prize Contest Open Until July 1

Manuscripts from candidates for the Albert Joachim International Prize must be received by the secretary-general of the Fédération Dentaire Internationale, 35 Devonshire Place, London, W. 1, England, not later than July 1, 1961. These will be considered by the international jury appointed by the Fédération and the award will be made at the Thirteenth International Dental Congress to be held in Cologne, Germany, July 7-14, 1962.

Attention is drawn to the fact that the rules for this prize have now been amended and as a result both published and unpublished theses on original scientific research of a laboratory or clinical nature in the field of odonto-stomatology carried out not longer than five years previous to July 1961 are eligible for the prize.

The 1962 award will be 50,000 Belgian francs (about $1,000). The complete set of rules is obtainable on request from the secretary-general of the FDI.

■ Residency, Internship Program at Memphis Veterans Hospital

The Veterans Administration Medical Teaching Group Hospital of Memphis, Tenn., announces that two rotating dental internships and one residency in prosthodontics will be available for the year beginning in July. Information and application forms can be obtained from the chief of the dental service of the hospital.

■ Robert B. Shira Honored by Oral Surgeons

Col. Robert B. Shira, chief, oral surgery section, Walter Reed General Hospital, Washington, D. C., is the first Army officer to be elected to the executive council of the American Society of Oral Surgeons. Dr. Shira was the recipient this past year of the Hinman Award for outstanding contributions to dentistry.

■ Annual Meeting of the International Association for Dental Research

The thirty-ninth annual meeting of the International Association for Dental Research will be held March 23-26 at Boston. The Dental Materials Group, composed of IADR members whose chief research interest is improvement of materials used in dentistry, will meet concurrently.

For the first time in the association's history, commercial exhibits will be a part of the 1961 meeting under the supervision of the IADR and the American Association of Dental Schools, which will meet March 26-29.

■ Spanish Orthodontic Society to Meet in Valencia

The Spanish Society of Orthodontics will meet April 27-30 in Valencia. A. J. Cervera, Avda. del Oeste, 29, Valencia, is chairman. D. Costa del Río of Barcelona is president of the society and S. Alvarez Biosca of Madrid is secretary.

■ Public Health Service to Control Medical 'Stockpile'

Responsibility for planning and operating the nation's emergency medical stockpile program has been assumed by the Public Health Service, it has been announced by the Office of Civil and Defense Mobilization and the Department of Health, Education, and Welfare. The transfer of authority from OCDM to PHS involves about 200 million dollars' worth of medical supplies and equipment located in 33 warehouses throughout the country. Included in the stockpile are 1,932 "packaged" 200-bed hospitals for civil defense emergency use, valued at $20,000 each. About 1,500 of these are now stored at strategic locations across the country and others are in use for demonstration purposes and for training personnel.

■ Southeastern Society of Oral Surgeons to Meet at Miami Beach

The Americana Hotel in Miami Beach, Fla., will be the site of the meeting of the Southeastern Society of Oral Surgeons April 27-29. Edward H. Martin, 1900 Hayes St., Nashville 4, Tenn., is the secretary-treasurer of the society.

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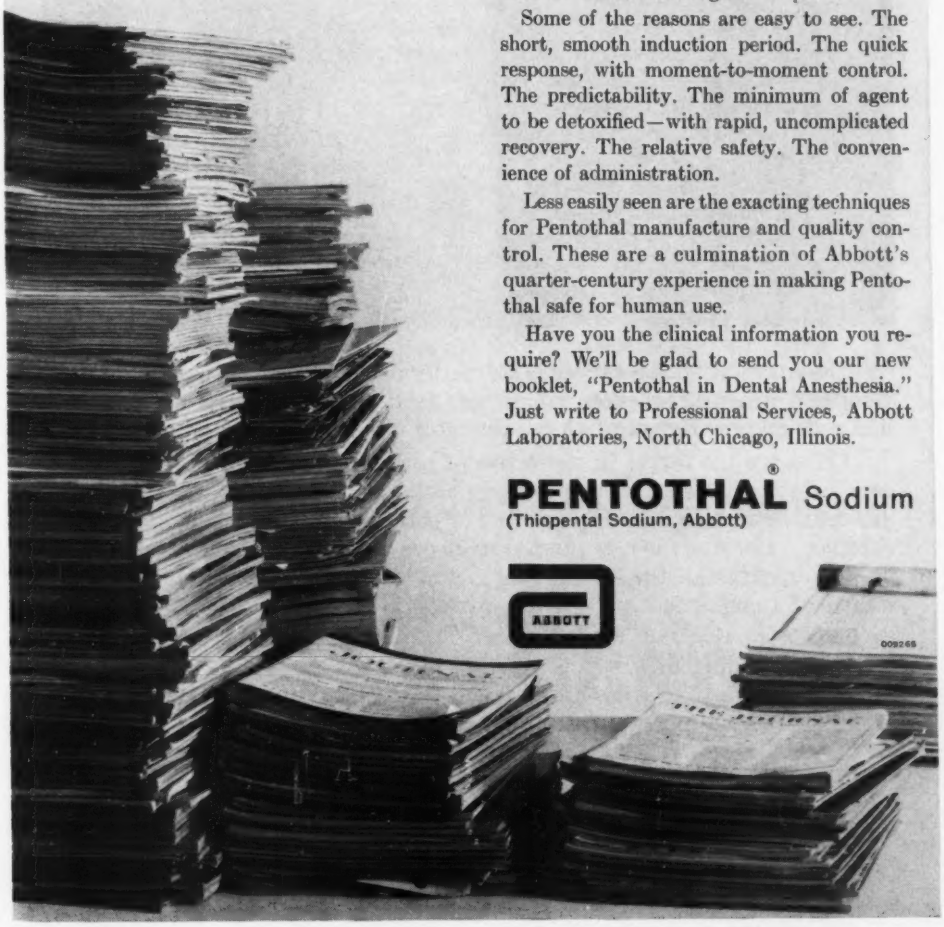

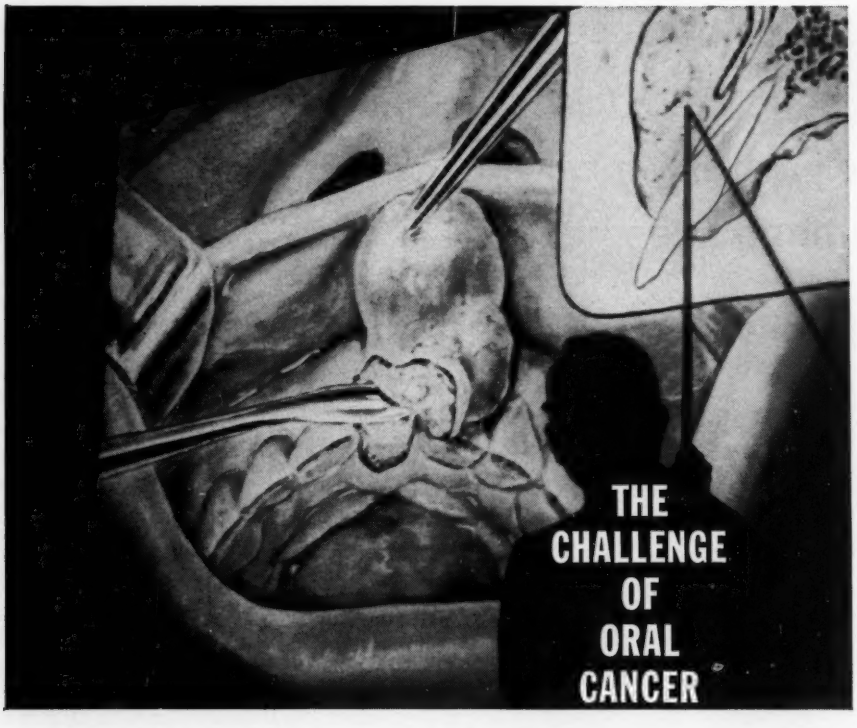

The curability of all cancer is primarily dependent upon its early detection, and prompt, adequate treatment. Oral cancer is relatively easy to diagnose at an early stage when successful treatment can be accomplished.

These are the facts: In one series of cases of oral cancer, the five-year cure rate for patients with both early and advanced lesions was only 32.5 per cent. In another series, consisting of patients with lesions *less than two centimeters* in size, the rate jumped to 57 per cent. The cure rate would even be ***higher,*** were all the lesions discovered when they were localized, and measured 1 cm. or less.

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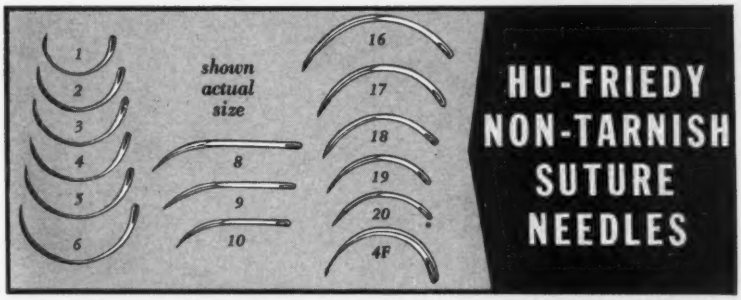

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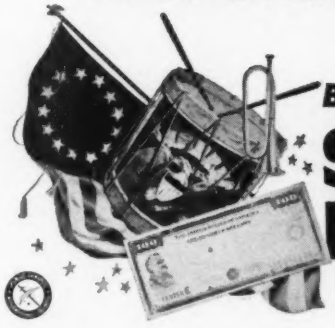

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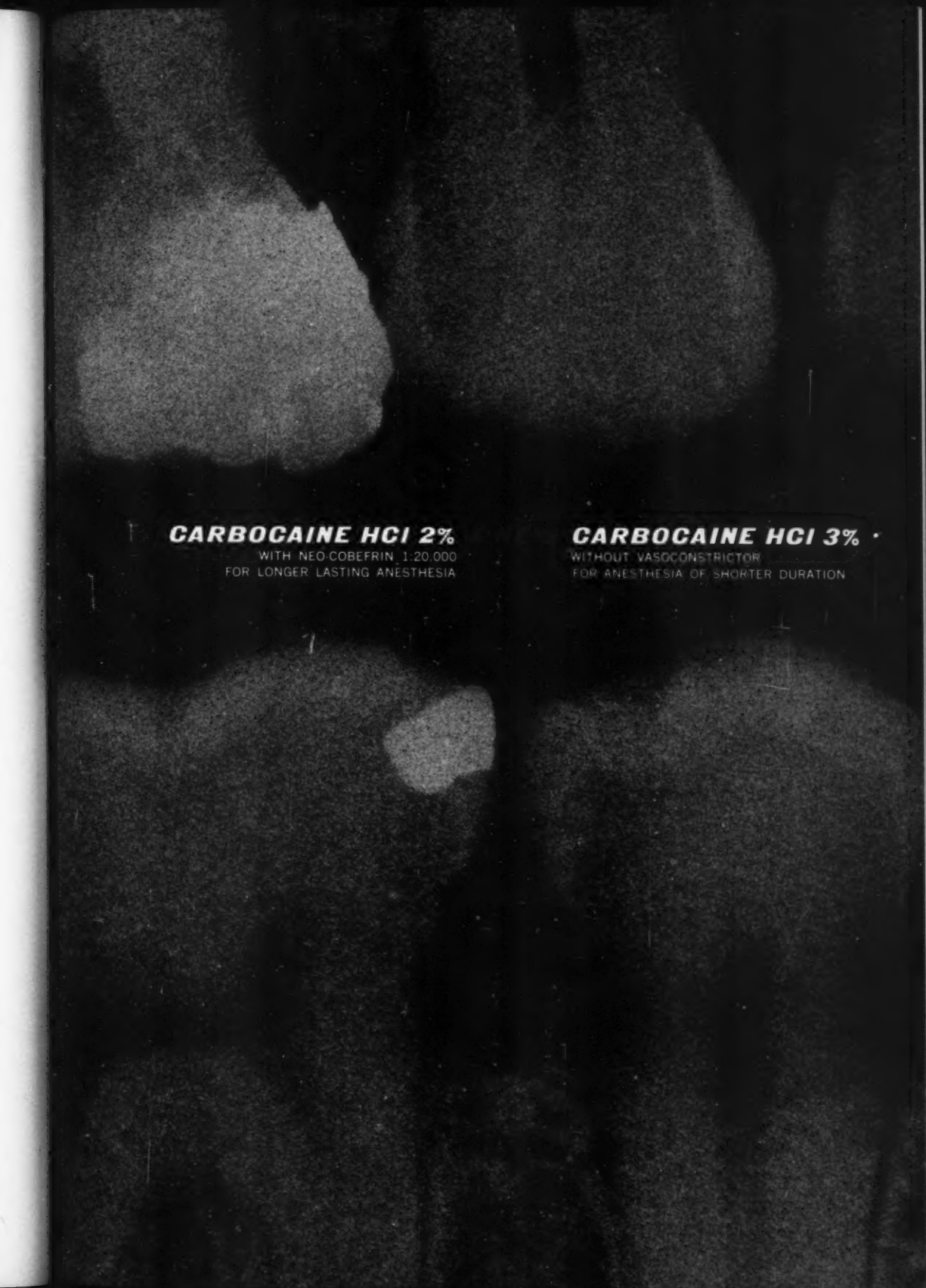
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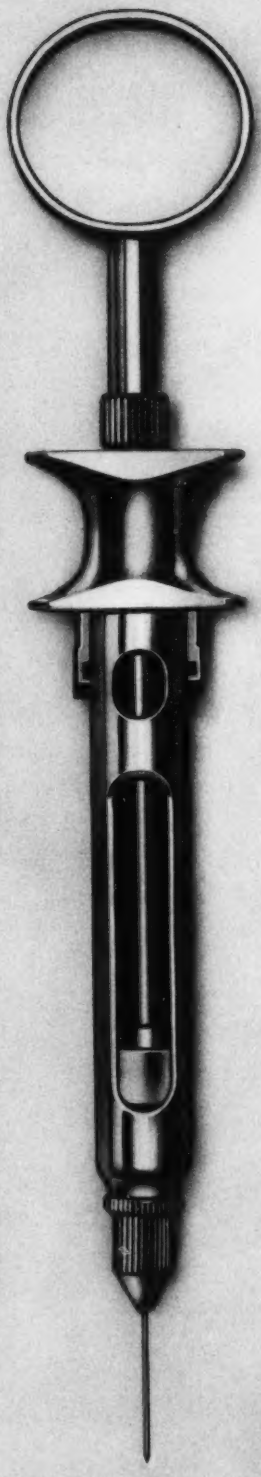

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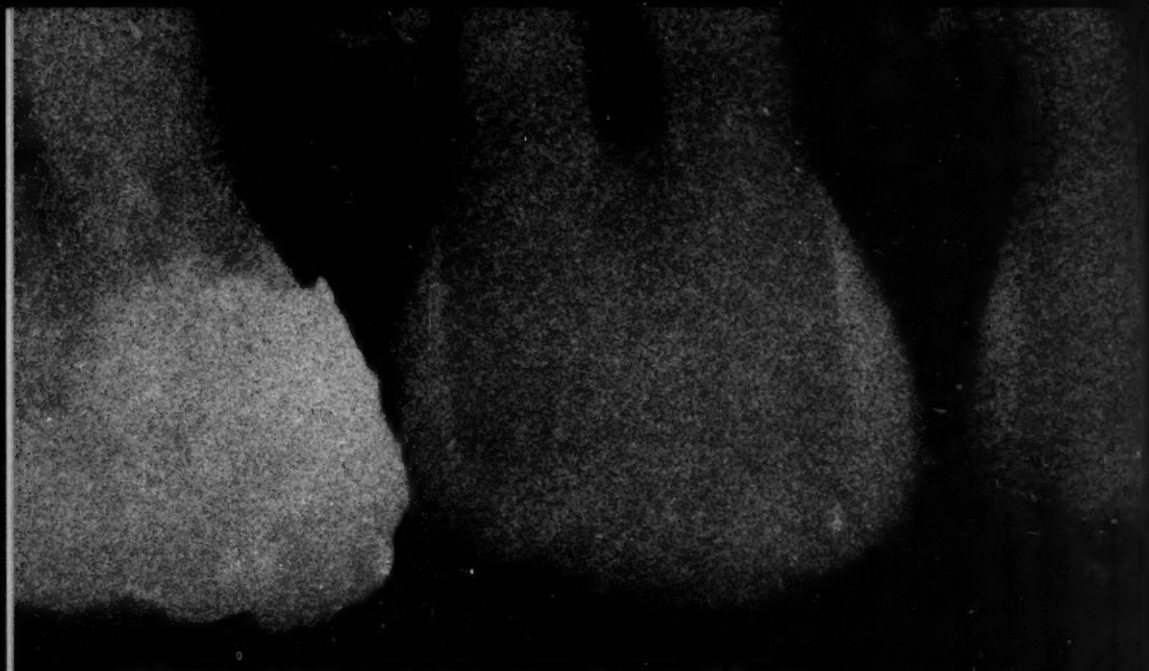

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